RAILROAD GAZETTE

FRIDAY, NOVEMBER 18, 1898.

CONTENTS.

ILLUSTRATIONS:	PAGE
The Buckling of the Trusses of the New York and Brooklyn Bridge	824
Abandonment of the Carbondale & Honesdale Gravity Railroad	826
Consolidation Locomotive for the Delaware & Hudson	827
New Pennsylvania Passenger Station at Jersey City	828
Consolidation Locomotives for the Union Pacific	829
Schoen Pressed Steel Body Bolster	832
CONTRIBUTIONS:	
A Japanese Bridge	823
Interstate Commerce Commission Demands More Power	823
EDITORIALS:	
The Design of Suspension Bridges	830
EDITORIAL NOTES	830, 831
New Publications	831
Trade Catalogues	831
GENERAL NEWS:	
Locomotive Building	836
Car Building	836
Bridge Building	836
Meetings and Announcements	836
Personal	837
Elections and Appointments	837
Railroad Construction	838
Electric Railroad Construction	839
General Railroad News	839
Electric Railroad News	840
Traffic	840
MISCELLANEOUS:	
Technical	833
The Scrap Heap	834
General Passenger Agents	825
The Naval Architects and Marine Engineers	827
Foundations for the Post Office and Custom House at Chicago	827
The Boston Elevated Railroad	828
The Purchase and Inspection of Supplies	828
Foreign Railroad Notes	829
Explosive Mixtures of Illuminating Gas and Air	832
Cost of Carrying Mail on the Southern Pacific	832
Railroads and Floods in Austria	833

Contributions.

A Japanese Bridge.

To the Editor of The Railroad Gazette.

I have read with considerable interest the article descriptive of the Kintai-bashi (Golden Belt bridge) over the River Nishikigawa, at Iwakuni, Japan, which appeared on page 807 of your last issue. The manner in which the bridge was designed is fully as interesting.

The Daimio, or governor, of the province, not having a corps of engineers and a draughting department, proceeded to make his own plans. He took pieces of candy and bound them together until they formed a complete model of the structure as it now appears. All that was necessary was to instruct his workmen to build a bridge like the model, which was promptly done.

The river bed was also paved evenly with flat stones for a distance of some 260 ft. to the left of the bridge (looking at the picture). I do not understand your reference to "The piers are 20 ft. higher than the river bed and are paved 250 ft. wide on both sides of the bridge," but take it that you intended to refer to the paving of the river bed.

While on the subject it may be interesting to know that among the fish that inhabit the water in the immediate vicinity of the bridge is one in the form of a worm which gathers small stones and builds on the river bottom a nest known as the Ningyoseki, or stone doll, which greatly resembles the outline of a doll. I append a small sketch to illustrate the general appearance of the Ningyoseki. The different sections of the worm nest are held together by a sticky deposit, generated by the fish, which, mixed with the gravel, forms a cement. The river bed, in shallow places, is covered with many of these peculiar forms, which are uniform in appearance and size.

S.

The Interstate Commerce Commission's Demands for More Power.

Louisville, Ky., Nov. 7, 1898.

To the Editor of the Railroad Gazette:

The strenuous attempts to secure legislation radically enlarging the powers of the Interstate Commerce Commission bring forth in some quarters a series of arguments which are quite anomalous and misleading. It seems to be admitted that the paramount evil of the situation is the demoralization of rates growing out of illegal and secret rate cutting, and resulting in the most palpable and injurious discriminations, and also in the unnecessary depletion of earnings. Attempts are made to point out the causes of this admitted evil; and it is suggested that the remedy for it is prompt compliance on the part of Congress with the far-reaching demands of the Interstate Commerce Commission. But careful consideration of the subject will show that this evil is not due to the causes suggested by these advocates of the demands of the Commission, and that it will in no wise be cured by the remedies which they insist upon.

The causes of this secret rate cutting, as suggested by this class of advocates, seem to fall under three heads: First, the prohibition of pooling contained in the Interstate Commerce Act; second, the construction placed upon the Anti-Trust Law by the Supreme Court of the United States in the Trans-Missouri case and in the Joint Traffic Association case; and, third, the construction placed upon the Interstate Commerce Act by the Supreme Court of the United States in several cases, denying the Interstate Commerce Commission various powers which that ambitious tribunal has with ever-increasing zeal arrogated to itself.

If the prohibition of pooling is responsible for the present rate cutting, one would expect to find that such rate cutting did not exist before pooling was prohibited. Yet, those familiar with the railroad situation in the United States prior to 1887, the date of the enactment of the Interstate Commerce Act, know that rate cutting was widespread, despite the fact that pooling was not prohibited, and was even widespread among railroad companies in the very face of pooling contracts existing between them. Even pooling contracts cannot eliminate or materially diminish the motive of each separate railroad company to increase its tonnage, as compared with the tonnage of its competitors, for this motive necessarily continues active in the highest degree, to the end that each railroad may maintain its present share of the pooled earnings, and also that it may be in a position to demand an increased share. Nor would the maintenance of rates under pooling contracts be made any easier by express legal sanction and supervision of those contracts. Such legal sanction and supervision could not possibly be more effectual than the explicit provisions of the present Interstate Commerce Act, which prohibit absolutely any deviation by any common carrier from its schedules of rates published and filed with the Interstate Commerce Commission. If this provision cannot maintain rates, then no legal provision can do so. Precisely the same good sense and honesty, which are absolutely necessary to a maintenance of rates under pooling contracts, would, if exercised, bring about a maintenance of rates under the present law, and without pooling contracts.

Up to March, 1897, when the Trans-Missouri case was decided by the Supreme Court of the United States, the Anti-Trust Act was not supposed to prohibit traffic associations, designed for the maintenance of rates; yet it is notorious that never at any time were tariff agreements regarded by the railroads as having any legal effect; and they were violated with impunity. Their really important functions were for the interchange of information, and the prompt communication to all parties of any open changes in rates by any one of the parties; and it seems clear that, notwithstanding the Anti-Trust Law, substantially the same functions can now be discharged by meetings of traffic officials; that is, all the really valuable work that was done by the traffic associations. It is known that rate cutting was widespread before the decision of the Trans-Missouri case, and in the face of traffic agreements; and it has been widespread since. The conclusion is irresistible that that decision had no appreciable effect upon the matter. Indeed, if railroad companies are willing daily to violate a perfectly plain statute prohibiting, under heavy penalties, any deviation from their published rates, it is difficult to see how it can be hoped that those same railroads would comply with a contract among themselves to maintain rates. It can be confidently predicted that if railroads would uniformly observe the present law, and charge in all cases the rates fixed in the duly published schedules, making no reductions except upon three days' public notice, the present demoralization in rates would speedily disappear. If railroads openly disregard these solemn legal obligations, there is no ground whatever for hoping that they will discharge any greater obligations, or even the same obligations if imposed upon them merely by contracts among themselves.

The decisions of the Supreme Court as to the powers of the Interstate Commerce Commission have had no tendency whatever to facilitate or encourage rate cutting. On the contrary, of the only two decisions having any connection with that subject, one has furnished the Commission with a powerful aid in the enforcement of the law against rate cutting. (Brown v. Walker, 161 U. S., 591.) In this case the Court held that the amendment of 1893, to the effect that no person should be excused from testifying before the Interstate Commerce Commission on the ground that his testimony might tend to criminate him, was constitutional and enforceable. This gives the Commission the fullest opportunity to inquire, in the most searching manner imaginable, into all violations of the law, and to discharge the duty imposed upon it by the statute, to see that the law is complied with. The other decision is Wight v. United States, 167 U. S., 512, holding that the fact that a warehouse has a sidetrack to a competing road does not authorize another road to the same city to offer a rebate to compensate for cartage, which decision clearly indicates a disposition on the part of the Supreme Court to give the strictest possible construction and the most complete enforcement to the unjust discrimination section of the law, which, if enforced, would absolutely stop all rate cutting.

The only other decisions of the Supreme Court, regarded even by the Commission as depriving it of important powers, which it had assumed to exercise, are the Import Rate case (Texas & Pacific), (162 U. S., 197), the Social Circle case (162 U. S., 184), the Maximum Rate case (C. N. O. & T. P.), (167 U. S., 479), and the Alabama Midland case (Troy, Ala.), (168 U. S., 144).

In the Import Rate case the Court held that competition might warrant the inland carrier in accepting as its proportion for the transportation of import traffic less than its full rate for domestic goods passing over the same part of its road. In the Social Circle case the Supreme Court enforced an order of the Commission under the long and short haul section. It also held in that case, and likewise in the Maximum Rate case, that the Interstate Commerce Commission had no power to make rates for the railroad companies. In the Alabama Midland case the Supreme Court held that competition might warrant railroad companies charging less for a long than for a short haul without previous application to the Interstate Commerce Commission.

It will readily appear, upon consideration, that not one of these decisions has any bearing upon rate cutting, and these cases might have been decided the other way without in the slightest degree tending to decrease that rate cutting. Rate demoralization is not, therefore, due to the causes thus assigned by some of the advocates of the Interstate Commerce Commission. Further consideration will show that the gratification of the demands of those advocates would not in the slightest degree tend to remove that evil.

The Commission desires power to prohibit, whenever it chooses, charging more for a short than for a long haul. The Commission's course in the past clearly shows that if it were given this power, it would, to the serious detriment of the commerce of the country, in many cases absolutely prohibit the making of less charges for longer hauls, notwithstanding the fact that those less charges are called for by unavoidable and controlling competition. Any such course would have a decided tendency to increase rate cutting instead of to restrict it. Under the law at present it seems that the carrier may, when forced to it by substantial and controlling competition, which it has not itself brought about, reduce its rates to meet that competition at points where it prevails, without reducing its intermediate rates. The carrier could, therefore, openly meet any such competition in conformity to the law. But if the Commission gets the chance to do what it has often sought to do, absolutely prohibit charging less for long hauls in many cases of controlling competition, there will be the temptation in all such cases to meet the competition by secret rate cutting; and the more salutary method of meeting it by open and lawful reductions will be, in a great many instances, rendered impracticable.

The Commission also wants provision made that rates shall be changed only upon 60 days' notice, unless the Commission shall authorize shorter notice. Under the law as it stands at present, the carrier honestly striving to comply with the law can, when apprised of rate cutting by its competitors, openly combat such a course by lawful reductions of its own rates upon three days' notice. The Commission now proposes to deprive carriers of this lawful method of meeting competition upon short notice, and to put an almost insuperable obstacle in the way of meeting in a lawful manner the illegal acts of competitors, thereby decidedly increasing the temptation to secret and illegal rate cutting. To compel a carrier to wait 60 days, or even till it could go through the slow process of getting a special dispensation from the Commission (if it could accomplish that in less than 60 days) before meeting in a lawful manner the illegal acts of its competitors, would be preposterous. The Commission had better enforce the present law, which prohibits reductions in rates unless upon three days' public notice, before it seeks to extend that notice to 60 days.

The Commission also demands an unlimited power to make rates for the railroads, subject only to a power of review in the courts, which review, upon careful investigation, will be found to afford very little practical protection to the carriers. The Commission and its advocates industriously seek to create the impression that this power is of the most limited character, but a reading of the Cullom bill (S. 3354)* will show that the power is practically without limitation. The Commission may act not only upon complaints, but upon its own motion, not only upon a single rate at a time, but upon any number of rates, at its option; not merely upon a single carrier, but upon as many carriers in the same proceeding as it may choose to bring before it. The rates fixed by the Commission under these circumstances will become absolutely binding 30 days after the Commission's order is made, unless the carriers, in the meantime, choose to take the matter into court and can convince the court, upon the face of the record, that the order of the Commission is plainly erroneous; otherwise the rates so fixed will go into effect pending the review. The review by the court is restricted to the evidence heard by the Commission, and the court can only obtain additional light by referring the case back to the Commission for further investigation. As a practical matter, this power of review will be of very little value. The Commission will be disposed to make the most unlimited use of the practically unrestricted power which would thus be conferred upon it, as is illustrated by its action

*Railroad Gazette, April 15, 1898, pp. 275, 279.

in the Cincinnati and Chicago Freight Bureau cases, where, without any legal authority, it assumed to make an order, directed to about 30 interstate carriers, requiring the establishment of new rates, within much reduced maximum limits, fixed by the Commission, upon several thousand commodities, from Chicago and Cincinnati to eight important cities in four of the Southern states. To contend, therefore, that this power would be used in a sparing manner is to disregard the history of the Commission. This tremendous power, however, would not have the slightest tendency to prevent rate demoralization. The order of the Commission to a carrier to charge not exceeding a certain maximum, or even to charge a certain rate prescribed by the Commission, and neither more nor less, could not possibly be any more direct, or any more capable of enforcement, than the express language of the present law, to the effect that a carrier must charge neither more nor less than its published rates; and yet it is known that these published rates are departed from every hour by many of the largest railroads in this country. These grave powers, therefore, cannot tend to remedy the evil of the situation.

The whole list of additional powers desired by the Commission, as shown in the Cullom bill, can be examined, and not one will be found that will in any wise tend to correct the rate demoralization now existing. The only additional legislation which could by any possibility be regarded as having that tendency would be the enactment of some such bill as the Foraker bill, relative to pooling; but, as above pointed out, even the enactment of such a measure would be only a very short step in the direction of the prevention of rate demoralization, for the reason that such demoralization has heretofore existed in this country between parties to pooling contracts during the time that the pooling contracts were in force, and there is no reason to believe that the same conditions would not be repeated if pooling were returned to. When this fact is considered, the value of the right to pool will be found to be very much less than it is generally assumed to be, and its value to the railroads or to the public is far too small to justify granting to the Interstate Commerce Commission the tremendous powers which it now desires, and which, if granted, would give it a power over the interests of the railroads and over the interests of the public which would be detrimental to both, and which should not exist in this country.

The facts above suggested must bring any unprejudiced observer to the opinion that the advocates of the Commission's demands are wrong both in their premises and their conclusions. It is admitted on all hands that rate demoralization, due to secret concessions, is the evil of the situation, but that evil is not due to the prohibition of pooling or to the decisions of the Supreme Court, and it will not be corrected by giving to the Interstate Commerce Commission the enormous powers which it so diligently and through so many channels is now seeking to obtain. Indeed, rate cutting will be encouraged by some of the changes which the Commission desires in the law, as is above pointed out. It is extremely desirable, in a matter of this importance, to clear away all such false reasoning, and bring the public face to face with the real situation. These powers should be considered on their own merits, or rather, demerits, and as original propositions; and the country must decide whether, considered in and of themselves, they are demanded in the interest of the public, and whether any one tribunal in this country should be made as powerful as the Interstate Commerce Commission would be if its demands were satisfied. It is gratifying to note that some of the members of the Interstate Commerce Commission who at first sought to justify their demands under the plea that pooling was necessary for the railroads, and that these great powers were necessary to protect the public against the evils of pooling, have been forced to abandon this untenable position. The sooner all the advocates of the Commission's demands cease using the misleading arguments above pointed out, the easier it will be for the public to estimate at their true worth and to understand in their full significance the demands which the Commission, with a perseverance equaled only by its ambition, continues to assert. It can be confidently predicted that, when so viewed, it will be found that there is no necessity or excuse for gratifying the Commission's ambitious desires. M. H. SMITH.

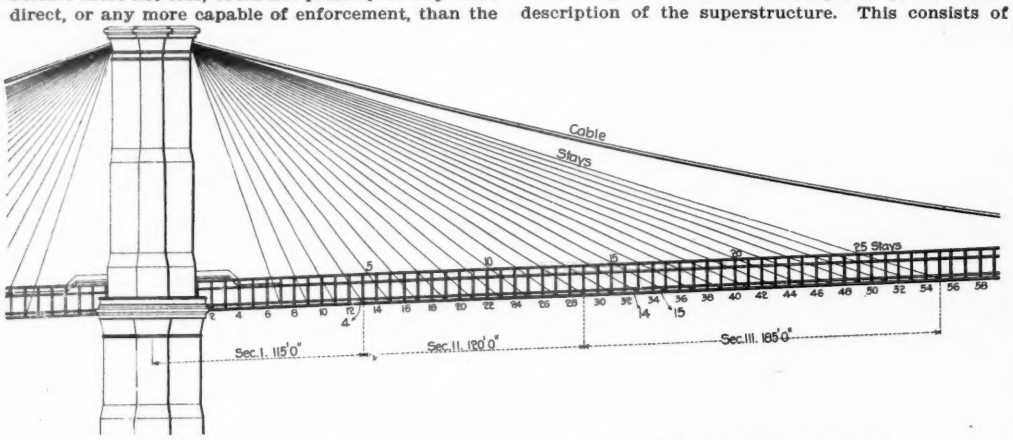
The Buckling of the Trusses of the New York and Brooklyn Bridge.

By F. Collingwood, C. E.

The following article is written by request, and for recent notes and measurements the writer is indebted to his former associates who are still upon the engineering staff of the bridge.

The Superstructure.

A clear presentation of the subject requires a brief description of the superstructure. This consists of



(The even numbers under the trusses show the points of attachment of corresponding suspenders.)

Fig. 1.—Elevation with Suspenders Omitted.—New York and Brooklyn Bridge.

two land spans, each 930 ft. long, and a central span of 1,595 ft. 6 in. It is supported by four cables, each assisted at each tower by 25 long stays, which reach from the top of the tower to the river span, and the same number to the land span. Fig. 1 is a general diagram showing the arrangement of the long stays

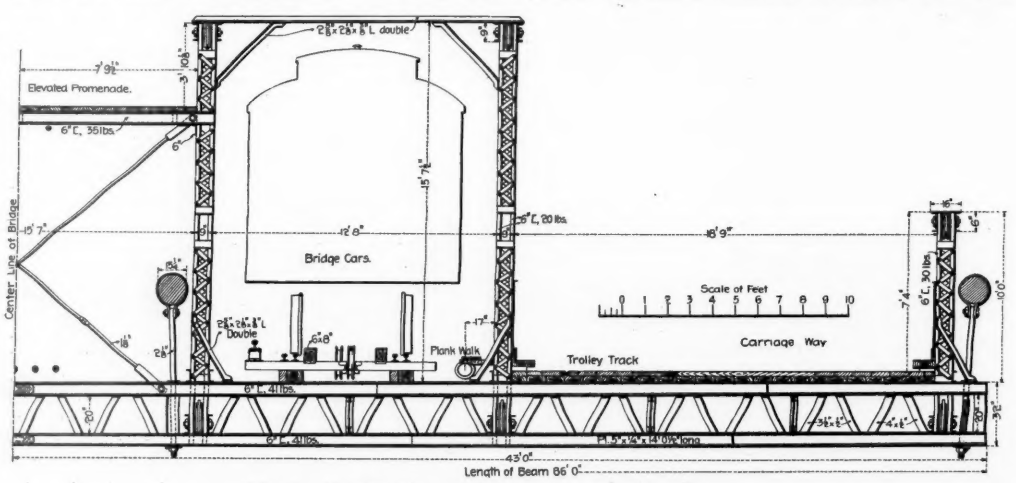


Fig. 2.—Half Section of Superstructure, Looking East.

at the river span of one of the towers. Fig. 2 is a cross-section of one-half of the bridge, near the center, showing two cables and three trusses. The cables will be referred to by the letters A to D (the former being the most northerly), and the trusses by the numbers 1 to 6. It will be noted that trusses 1 and 6 are supported by cables A and D, respectively; and

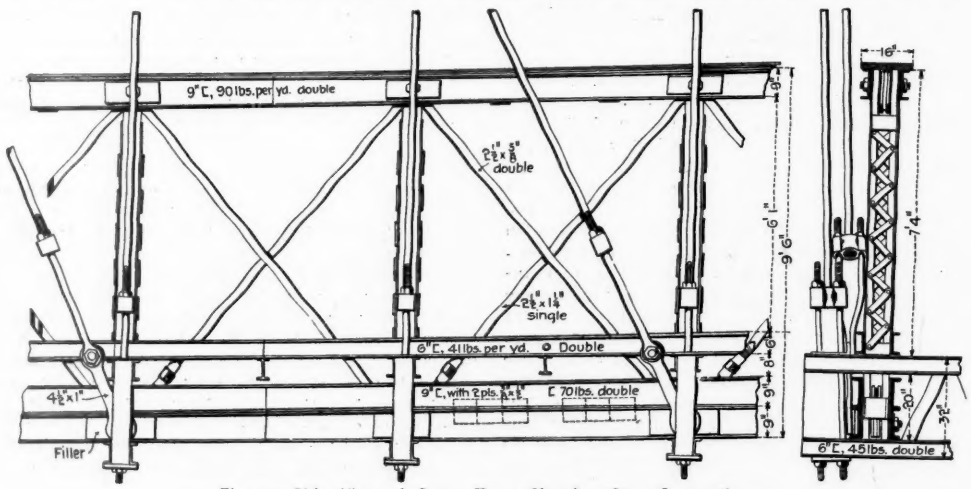


Fig. 4.—Side View of Outer Truss, Showing Stay Connections.

trusses 3 and 4 by cables B and C; while trusses 2 and 5 are attached only to the floor beams. All the trusses are securely anchored in the towers, and the sections are heaviest near the same.

In arranging recently for the passage of the trolley cars from the surface roads across the bridge, the tracks for their accommodation were laid in each roadway close to the intermediate trusses.

Fig. 3 shows a partial side view of the central and intermediate trusses, the panel lengths being mostly 7½ ft. Fig. 4 shows the outer trusses and the method of attaching the long stays to the bottom of the trusses. Fig. 5 shows two sets of eye-bars, which are solidly fixed in the masonry at each cable near the top of each tower. Fig. 6 is a cross-section, and Fig. 7 a longitudinal section of one of the bed plates. Four of these are set in the masonry at the top of each tower, and the rollers supporting the saddles travel upon them. Fig. 8 is a cross-section of one of the saddles.

The long stays are attached at their lower ends to alternate panels of the trusses; stay No. 1 at 70 ft. from the center of the tower, and No. 25 at 420 ft. out. At their upper ends stays 1 to 4 are attached to the lower set of eye-bars shown in Fig. 5, and stays 5 to 12 to the upper sets. Fig. 6 shows two bosses, or so-called "nigger-heads," cast on each bed plate; and for cables A and D stays 13 to 20 are attached to these, while for cables B and C only stays 13 to 16 are so attached. The bed plates for cables B and C were cut off at the point marked in Fig. 6, and the plates set with these edges in contact. This formed a groove 5 in. wide between the two, and in this groove stays 23 to 25 (or six in all) were placed, the ends being carried over the towers and attached to the land spans. As shown in Fig. 8, there were grooves cast at each side of the saddles, and stays 21 to 25 of cables A and D and 17 to 22 of cables B and C were placed in these, the ends being carried over and attached to the land spans.

The elevation of the long stays at the center of the towers is about 150 ft. above the roadway. The roadway arches upward, so that it is about 17 ft. higher at the center than at the towers. To allow it to accommodate itself to the changes due to changes in temperature and load, slip joints are provided at the center of each span; these allow of changes in length only.

The Buckling.

The unexpected event which gives reason for the present discussion occurred on July 29th last, at about 6:20 in the afternoon of an exceedingly hot day, a number of such days having preceded it. At a point on the southern roadway of the river span, about 200 ft. from the Brooklyn tower, a dray horse dropped dead from heat. This caused a total stoppage of the traffic at that point; and as car after car and team after team arrived at the rear of the stop-

was probably less than the average. As a result, there was a sudden movement, accompanied by a loud snapping noise; both of which were indications of an unusual condition of load and of an extensive

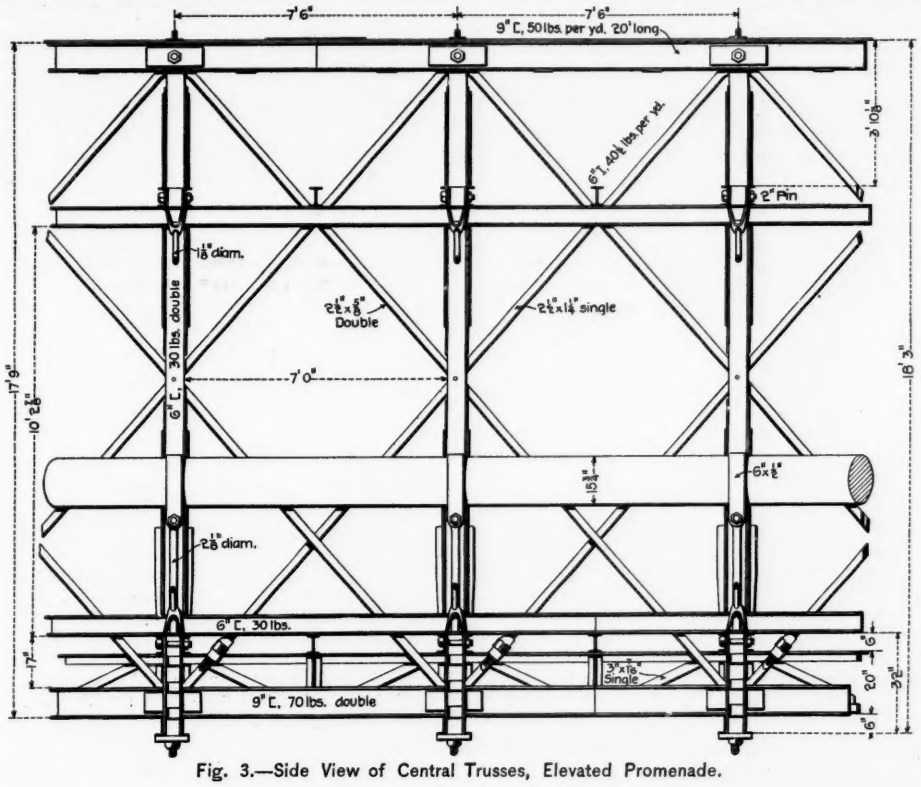


Fig. 3.—Side View of Central Trusses, Elevated Promenade.

readjustment of the parts of the structure to meet this change.

A careful examination of the bridge was immediately made, and it was found:

1st. That at 250 ft. out from the center of the Brooklyn tower (225 ft. from the masonry, or at the 13th long stay), in trusses 1 and 6*, and at the same distance from the New York tower, in truss 4, the channels of the lower chords were buckled. Also at

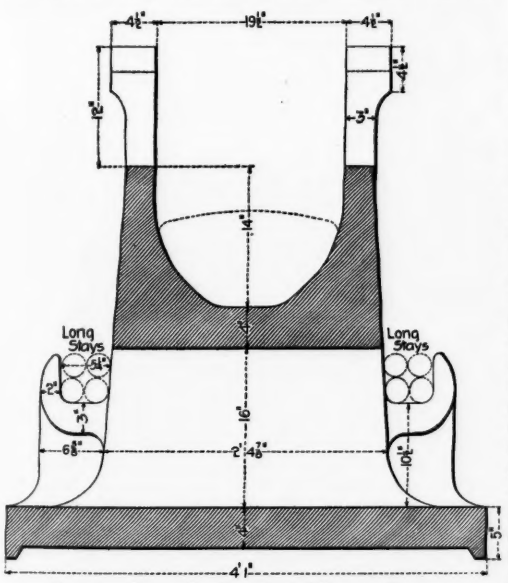


Fig. 8.—Cross Section of Saddle on Center.

265 ft. out from the Brooklyn tower, or at the 15th long stay, there was a buckling in truss 4. The last was the greatest of all, and was about 6 in. At some previous period truss 3 had also buckled at both ends of the center of the span at stay 14. Neither of the intermediate trusses and none of the floor beams was buckled. This is important.

2nd. Immediately after the occurrence, the suspenders and long stays in the immediate vicinity of the buckling were under high tension, while those nearer the towers, and all the stays passing over the towers in any way, were greatly less strained.

3rd. The slip joint at the center of the roadway had not moved freely. The planking had closed tightly, but the joints in the rails had not, and the bolts for some distance each way from the center, which held the rails to the planking, were sheared off. The slip-joints in the trusses, too, showed evidence of imperfect adjustment.

4th. At cables B and C (trusses 3 and 4) the six stays, 23 to 25, inclusive, which pass over the towers in the grooves between the saddle plates, were pulled at each tower about 2 in. toward the river.

5th. The positions of the saddles were observed on July 20th, or nine days before the occurrence, and on the 30th, or one day after. The comparison is given below, and shows that the saddles at cable A approached each other only ½ in., while those at D moved 5⅜ in., causing a drop in that cable at the centre of the river span of about 13½ in., corresponding with what had been computed should be the result under the conditions described. The saddles are gradually returning to their normal condition.

Cable.	A.	B.	C.	D.
At the Brooklyn Tower...	½ in.	1⅝ in.	2 7/16 in.	3⅜ in.
Differences	1⅛ in.	1 1/16 in.	1/16 in.	
At the New York Tower..0.0 in.		¾ in.	1⅝ in.	2 in.
Differences..... ...		¾ in.	⅞ in.	⅜ in.
Total Measurement.....	½ in.	2⅜ in.	4 1/16 in.	5⅜ in.
Differences.....	1⅞ in.	1 1/16 in.	1 5/16 in.	

*As noted previously, the numbers and lettering begin at the north side of the bridge.

The Causes of the Buckling.

Passing from the known facts, no profound reasoning is required to show what was the immediate cause of the somewhat alarming incident under discussion.

This article is not intended as a criticism. Many of us are wiser now than we were 30 years ago. The bridge was designed to transport safely certain assumed loads, but not any such a load as the one of July 29th. It may be well to state here, that during the building of the bridge it was seriously questioned by many whether the structure would *ever* be largely used. While the engineers believed that the growth of traffic would be rapid (as may be seen by early reports to the Board of Trustees), conservatism ruled the day, and many things the engineers would like to have done were not done. The report made by the board of experts in 1897 recommended practically the same loads upon the bridge as those for which it was designed, one requirement being that the cars should be limited on each track to a distance of at least 102 ft. apart. So long as this loading was not exceeded the bridge did its work well, and that it passed safely through such a severe test as that of July 29th should be reassuring to the public. It is not believed to be practicable that the bridge shall be so loaded in use as to be in danger of total failure, but the failure of some minor part may readily induce a panic, with very serious results.

A very careful study of the effects of temperature upon the bridge was made by one of the engineers before the opening. These showed that at low temperatures practically none of the dead load came upon the stays, except the first four next to the towers, which acted to assist the trusses (no part of this load passing to the cables); that the next eight stays, or to No. 13, carried about one-third of the live load on that part of the span; and that from the 13th to the 25th stay only about one-ninth of the live load came upon the stays. At *high* temperature, however, the stays near the towers carried but one-half what they did before; the stays thence to No. 13 carried one-half of that part of the dead load and all of the live load; and the rest of the stays carried more than twice what they did before. The greatest increase of strain in the stays, due to temperature, this computation shows to be approximately in those at 225 ft. from the center of the towers.

Reviewing the observations, we find on July 29th an excessive load on the center span, and a long continued high temperature. These both tended to depress the cables at the center; while the expansion of the trusses by heat, and the imperfect action of the slip-joint, tended to elevate the roadways. The excessive strain on the long stays passing through the central grooves over the towers caused them to slip forward as noted; while the long stays resting on the saddles moved forward with them. The next set of

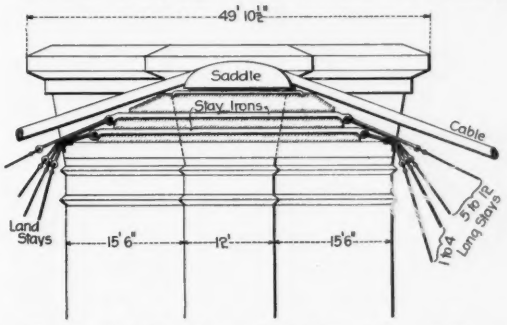


Fig. 5.—Part Elevation and Section of Top of Tower

stays, being rigidly fixed, could not yield, and before equilibrium could be established the trusses yielded to the compressive and transverse strains thus developed, by a crippling of the lower chords. It should be noted here, that the strengthening of the trusses previously mentioned ceased at the panel between the points of attachment of stays 8 and 9, and began again between 18 and 19, the points of buckling being about midway. If the deflections due to the movements of the respective saddles be computed, it will be found that they agree quite closely with the positions taken by the trusses, and there seems to be nothing further required in explanation of the disturbance.

It is unfortunate that anything should happen to disturb, even temporarily, the confidence of the public in the integrity of the structure; it is sufficient to say that it does not disprove the accuracy of the figures as to its strength. There is, however, a right and wrong way to treat an engineering structure. One *wrong* way is to disregard the protests of those who designed it, and give it up to the use of a number of conflicting interests. The disturbance of July 29th was due to a total lack of attention to the rules made by the engineering department.

General Passenger Agents.

The 43rd annual convention of the American Association of General Passenger and Ticket Agents was held at Detroit, Oct. 18 and 19. Extracts from the addresses of Mr. Caldwell and Mr. Martin were given in the Railroad Gazette of Oct. 21 and Nov. 4.

Among the committees which reported at the meeting was that on uniformity in state laws. The suggestion that attempts be made to secure changes in the laws of various states, in order to promote uniformity throughout the country, was not favorably received; by keeping away from the legislatures as much as possible the traffic manager may lose some favors, but he will also be likely to avoid some kicks. It was then suggested that a compilation be made showing the disparities in the laws as they now exist, but Mr. De Haven, who had made considerable study of the laws in the several states, stated that he had found the differences very slight, and did not believe that extended research into the matter would be worth while; and a proposition to appoint a judiciary committee to take up this subject was voted down.

The discussion of the discontinuance of unlimited tickets brought out the fact that the use of strictly limited tickets for local, as well as interline traffic, is becoming common. Officers of the Trunk Line Association reported that the protection afforded

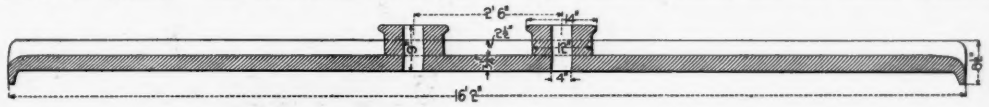


Fig. 7.

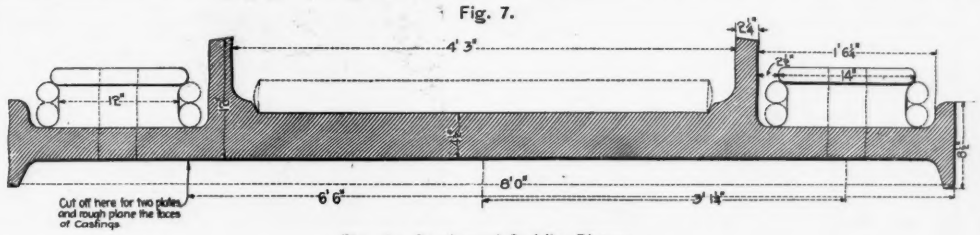


Fig. 6.—Section of Saddle Plates.

by limiting local tickets to very short periods was regarded by the roads interested as of much value.

The committee on the use of safety paper for interline tickets reported that the arrangements with the manufacturer, the Perfect Safety Paper Co., of Franklin, O., and with the Association of Railroad Ticket Printers, had been practically settled. The paper company has signed the necessary contract and given bond, and 12 different printing houses, having complied with all the requirements of the Association, have been licensed by the Secretary. The Association trade mark is to appear in water mark on each coupon. The Association is not committed to any uniform price for tickets. The prices named in the proposition of the Printers' Association were: for 1,000, 6 cents per 100 coupons; for 500, 7½ cents per 100 coupons; for 250, 10 cents per 100 coupons.

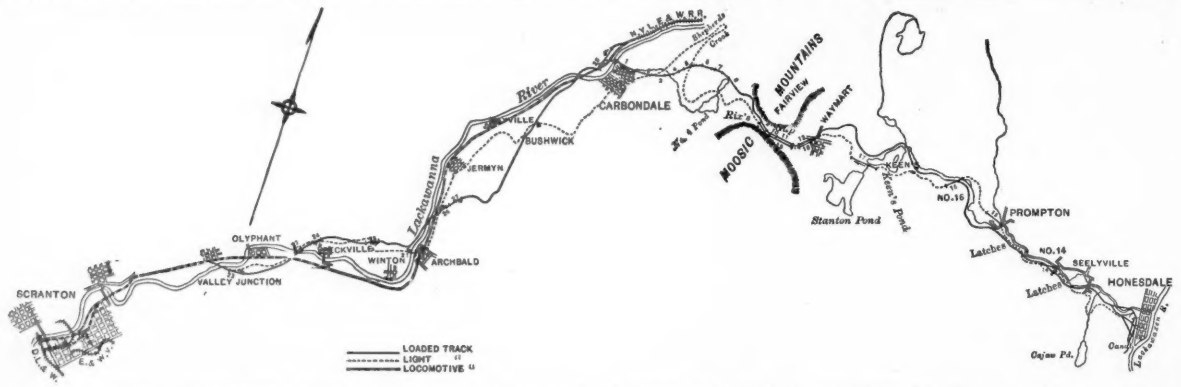


Fig. 1.—"Gravity" Railroad" of the Delaware & Hudson Canal Company, from Olyphant to Honesdale, Pennsylvania.

Abandonment of the Carbondale and Honesdale Gravity Railroad.

As briefly announced in the Railroad Gazette of November 4, the coal railroad of the Delaware & Hudson Canal Company from Honesdale, Pa., westward over Moosic Mountain and through Carbondale to Valley Junction at Olyphant, is to be abandoned. This railroad is 26.31 miles long. (The second or "light" track, for returning the empty cars westward, is 29.92 miles long.) The announcement issued by the company states that all freight, coal and passenger, traffic over the gravity road will be discontinued at the end of the present year, December 31.

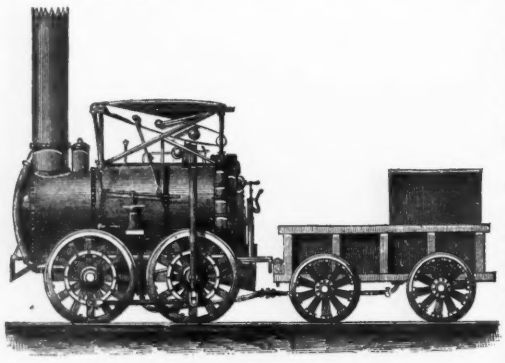


Fig. 4.—The Stourbridge Lion

The cause is the low price of coal and the high cost of working the railroad. The track is 4 ft. 3 in. gage and the capacity of the cars is only five tons (11,200 lbs.) each. The stationary engines which are used to haul the cars up the ascending portions of the line can take only five loaded cars at a time. The coal has to be transferred to the canal boats at Honesdale, and if it is to go to any point beyond the Hudson River or New York harbor it is again transferred from the boats. The introduction of large locomotives and cars has so cheapened the cost of ordinary railroad transportation that the gravity road, with its stationary engines, and the canal, are defeated in the competitive race; and the fact that standard gage cars can go direct to the yards of consumers everywhere gives them an advantage, even were the cost of transportation per mile no less.

It is not unlikely that the company's canal, which extends from Honesdale, Pa., to Rondout, N. Y., 108 miles, will also be abandoned at the end of the present season, though the company can deliver coal to the boats at Hawley by sending it over the Erie & Wyoming Valley railroad. The chief traffic on the canal is the coal delivered to it by the gravity railroad, and, for reasons already suggested, it has long since ceased to yield any profit to its owners. It has for many years been valued on the company's books at $6,139,-210, representing its cost, though last year $639,-210 of this amount was written off. The coal carried by the boats has steadily decreased, and it has latterly been less than 400,000 tons yearly. The abandonment of the railroad will throw a considerable number of men out of employment, and the citizens of Honesdale, Carbondale and other villages fear serious business depression. The combined forces of the railroad and canal number about 2,000 persons. Under the contract between the Delaware & Hudson Canal Company and the Erie Railroad (controlling the Erie & Wyoming Valley) the coal hitherto sent out by the canal can be delivered to the Erie at Jessup, Yatesville and Minooka.

As this is one of the oldest railroads in the world, that part from Honesdale to Carbondale having been finished and put in use before men were satisfied that the steam locomotive would be a commercial success, it will be of interest to briefly recall its history.

The first load of coal was carried over the road on October 9, 1829. This was about two years after the completion of the first coal railroad (in fact the first railroad of any kind) in the state of Pennsylvania, that at Mauch Chunk, now known as the "Switchback." The charter for the Carbondale & Honesdale line was included in that of the Delaware & Hudson Canal Company for the construction of its canal to the Hudson River at Rondout. The canal was begun in July, 1825, and finished in October, 1828. The gravity railroad was finished the next year from Honesdale as far west as Carbondale. The rails were of flat iron spiked to longitudinal timber stringers. The iron was ½ in. x 2¼ in., and was brought from England. From Carbondale to Moosic Mountain there were five ascending planes and the same number of slightly descending grades, called "levels." At the head of each plane there was a pair of iron drums, about 8 ft. in diameter and with 9 .n. faces. They were placed like the wheels of a bicycle and a cable was wound around them three times, with one end at the head of the plane and the other extending to the foot. On most of the planes there were two tracks, and the ascending and descending cars, attached to the cable, tended to balance each other. The drums were driven by a pair of horizontal engines.

The grades of the railroad as originally built were as follows, running eastward from Carbondale:

Ascending, 1 in 10	300 ft., horses
Ascending, 4.4 in 100	2,000 ft. "
Ascending (Plane No. 1), 1 in 12	2,000 ft., cable
Nearly level	600 ft.
Ascending (Plane No. 2), 1 in 20	2,600 ft., cable
Nearly level	2,600 ft.
Ascending (Plane No. 3), 1 in 12	2,550 ft., cable
Nearly level	400 ft.
Ascending (Plane No. 4), 1 in 12	1,800 ft., cable
Nearly level	2,000 ft.
Ascending (Plane No. 5), 1 in 12	2,500 ft., cable
Total to summit	19,350 ft. (3.7 miles)

Beyond the summit no stationary engines were needed, the loaded cars being always more than heavy enough to pull the empties up the steep grades. To the winding drums were connected large fan wheels, which were used as regulators in retarding the motion of the loaded cars down the steep grades. On the long "levels" horses were used. From the summit (1,915 ft. above tidewater and 945 ft. above the canal) toward Honesdale, the grades were:

Descending ("Summit level"), 8 ft. per mile	9,250 ft.
Descending (Plane No. 6), 1 in 12½	4,300 ft.
Nearly level	400 ft.
Descending (Plane No. 7), 1 in 11½	1,500 ft.
Descending ("Six-mile level"), 44 ft. per mile	Six miles
Descending (Plane No. 8), 1 in 20½	1,444 ft.
Descending (Four-mile level), 26½ ft. per mile	Four miles

The line has been extended and the tracks relocated, so that the six mile level on the east side is the only portion of the road, except a short piece near Honesdale, which is now on the original location.

The cars were at first hauled by chains, then by manila ropes, 7 in. in circumference, overlaid with small ropes and covered with coal tar. Though the ropes were thus carefully protected they were taken indoors every Saturday night and kept under cover until Monday morning. The ropes have long since been superseded by iron wire cables.

The foregoing applies to the line as it existed previous to 1842. In 1842-45 James Archibald (successor of John B. Jervis as Chief Engineer) relocated the entire line, except old plane No. 1. The accompanying map shows the location of the tracks as now laid, the eastbound, or loaded track, being in many places some distance away from the westbound, or light track. The light track was built at that time from Honesdale to Waymart, and in 1866-69 this track was extended to Carbondale. The light track from Moosic Mountain, westward to Carbondale, is now one continuous descending grade 14 miles long. At one point it was necessary, in order to preserve an approximately uniform grade, to build a loop about 1,000 ft. into the side of the mountain and return by an embankment. This part of the road is called the Shepherd's Crook. The introduction of the separate track for the empty cars obviated the loss of much time which formerly was necessary in order to have empty cars ready to balance loaded ones at each plane.

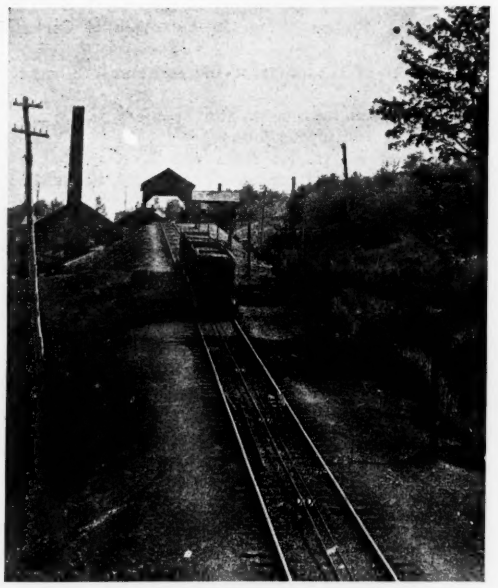


Fig. 2.—A Train of Coal Cars on the Gravity Railroad.

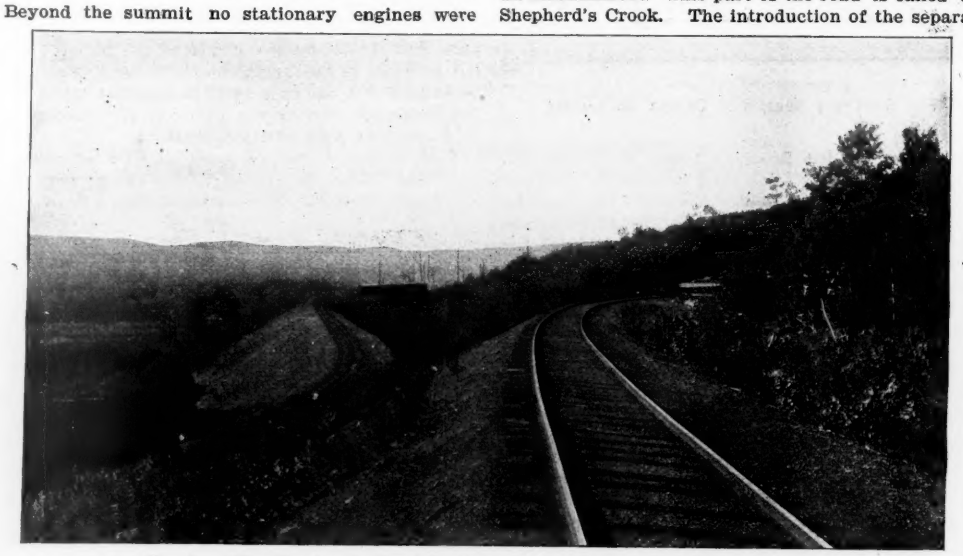


Fig. 3.—"The Shepherd's Crook"—Carbondale and Honesdale Gravity Railroad.

In connection with the changes made in 1842-45 water power was used for turning the drums at some

of the planes, but the water wheels were replaced by steam engines about 1856.

From Valley Junction to Scranton the gravity cars are accommodated by a third rail in a standard gage track and are hauled by locomotives, This third rail was laid in 1859, and about the same time the strap rails were finally abandoned.

On the six mile level between Old Plane No. 7 and No. 8 (about five miles from Honesdale), where loaded cars ran by gravity, the "level" descending at the rate of 44 ft. per mile, horses were employed to draw the empty cars up (westward), and they each drew, besides the four coal cars, a horse car, on which the horse rode back.

From Waymart to Honesdale the loaded track is now one continuous down grade of about 44 ft. per mile.

Passenger cars were first run on the gravity road in 1877, and in the summer there is a considerable excursion traffic, open cars being used. These cars are hauled in the same way as the coal cars, the speed up the grades being about 20 miles an hour.

The map and the illustration (Fig. 2) are from Cassier's Magazine for June, 1895. We are indebted for information to an article in that magazine by Mr. Charles W. Whiting, and to a manuscript by Mr. John Torrey, which is now in the possession of Mr. F. M. Olyphant, Secretary of the Delaware & Hudson Canal Company.

It was on this railroad, between Honesdale and Seelyville, that Horatio Allen, on Aug. 8, 1829, ran the first locomotive which was ever run on a track on the American continent. The engine, the "Stourbridge Lion," was brought from England by Mr. Allen for the Delaware & Hudson Canal Co., and its story is no doubt familiar to the reader. The engine was taken by boat to Honesdale, and after being set up was run experimentally for very short distances. On the date mentioned a large crowd was gathered, and the event was celebrated by the firing of cannon. There was doubt as to the strength of the track to support so heavy a load, considerable portions of the line being laid on wooden trestles, and Mr. Allen therefore decided that he would run the engine without an assistant, so as to risk no one's life but his own. This historic run extended for only about 1½ miles, the overhead bridge near Seelyville, for the Cherry Ridge road, being too low for the engine to pass under it.

The "Stourbridge Lion" appears never to have been used in actual service; it stood neglected for many years, and was broken up before anyone ever thought of writing down its history. The accompanying cut shows its general appearance. In view of the lack of authentic information as to precise details of its appearance and construction, it is worthy of note that there is now in the possession of Secretary Olyphant a photograph of the "Agenoria," an engine built by Foster, Rastrick & Co., of Stourbridge, at the same time they were building the "Lion," and which is believed to have been an exact counterpart of the latter. An engraving from this photograph appeared in the Railroad Gazette of March 31, 1893, page 239. The "Agenoria" is still preserved by the owners of the coal mine for which it was built. It differs from the "Stourbridge Lion," as the latter is shown in most of the existing pictures, chiefly in having a timber buffer beam at the front and a small dome on the boiler at the rear. It has no small tank beneath the boiler. Its wheels are of iron, but it is said that these were substituted for the original wooden wheels after the engine had been used a number of years.

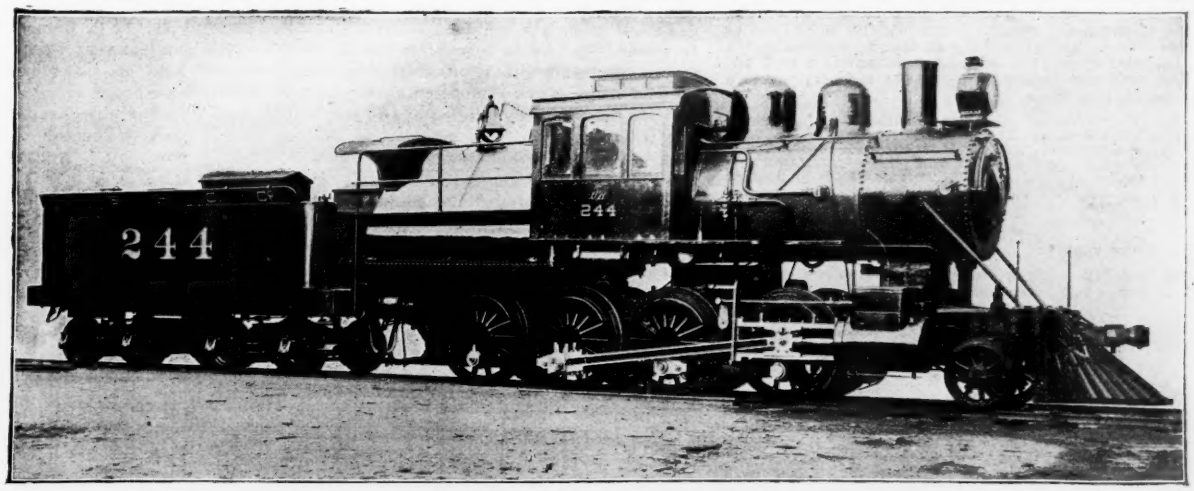
The Delaware & Hudson Canal Co. ordered three locomotives in England for use on the three longest levels of the gravity railroad, but it does not appear that any one of them was ever put in service on the road.

Consolidated Locomotive for the Delaware & Hudson.

The Dickson Manufacturing Co. of Scranton, Pa., sends us a photograph and specifications of a consolidation locomotive lately built for the Delaware & Hudson Canal Co. The engine is designed to burn anthracite coal, and is of 4 ft. 8½-in. gage. The principal dimensions, etc., are given in the following table:

Delaware & Hudson Canal Company—Consolidation Locomotive.

Weight on driving wheels	122,600 lbs.
Weight on truck wheels	17,400 lbs.
Total weight of engine	140,000 lbs.
Driving wheel base	15 ft. 4 in.
Total wheel base	23 ft. 6 in.
Diameter of cylinders	20 in.
Piston stroke	26 in.
Main rod, c. to c.	130½ in.
Valve	Balanced
Boiler	Wootten
Steam pressure	180 lbs.
Diameter inside, smallest ring	61 in.
Firebox, length	10 ft.
Firebox, width	8 ft.
Number of tubes	255
Length of tubes	13 ft.
Diameter of tubes	2 in.
Heating surface, firebox	173.4 sq. ft.
Heating surface, tubes	1,735.7 sq. ft.
Heating surface, total	1,909.1 sq. ft.
Grate area	80 sq. ft.
Material in barrel	Steel
Thickness in barrel	9/16 and 5/8 in.
Thickness in firebox crown	5/8 in.
Thickness in sides and back	5/8 in.
Thickness in tube sheet	½ in.
Crown stayed with	Radial stays
Boiler covering	Magnesia
Driving wheels, diameter	56 in.
Driving wheels, centers	50 in.
Driving wheels, material, centers	Steel
Driving wheels, journals	8 in. x 10 in.
Truck wheels, engine, diameter	33 in.
Truck wheels, kind	Taylor, steel tired
Truck wheels, journals	5½ in. x 10 in.
Tender:	
Capacity tank, water	4,000 gals.
Capacity, coal	7 tons
Tender frame	White oak
Tender trucks	Diamond
Tender truck wheels, diameter	33 in.
Tender truck journals	4¼ in. x 8 in.
Tender truck wheels, kind	Taylor, steel tires



Consolidation Locomotive.—Delaware & Hudson.

The Naval Architects and Marine Engineers.

The Society of Naval Architects and Marine Engineers held its annual convention in the city of New York last Thursday and Friday, winding up with a dinner at Delmonico's Friday night and a visit to the Bethlehem Iron Works on Saturday. The list of papers presented was published in our issue of Oct. 21.

President Griscom opened the proceedings in an address, in which he called attention to the prophesies made four years ago as to the importance of developing our commercial and military marine, and the fulfillment of those prophesies in our recent war. Of course he believes that one result of the war would be a great stimulus to the business of building ships in our country, and he says that foreign shipbuilders and capitalists have begun seriously to examine the advantages of this country for ship building.

Naval Constructor Tawresey read a paper on "Standard Navy Boats," which paper was prepared by Mr. Cassidy, a draughtsman in the Bureau of Construction and Repair. In the discussion Mr. Tawresey said that the service to which small boats in the navy are subject requires the best construction. He advised against the use of floating boats and also against metal boats. Mr. Griscom said that not enough attention is given to life boats by the merchant marine.

A paper by Assistant Naval Constructor Speer was presented on the subject of "Bilge Keels and Rolling Experiments," the sum of which was that bilge keels are almost necessary, if we are going to have sufficient steadiness for gun platforms. Mr. Bowles said that sea service had taught that bilge keels are necessary, and he hoped that they would hereafter never be omitted for war ships.

Mr. Babcock, General Manager of the Chicago Ship Building Co., read a paper on "Portable Pneumatic Riveters in Ship Building." In this he gave an account of the remarkable development of the use of compressed air for riveting, some of his figures having been published by us in recent issues. In the last ship built by him over 250,000 rivets, out of a total of 340,000, had been driven by air, and had the air capacity been greater, more would have been so driven.

Naval Constructor Bowles presented a paper on "Torpedo Boats and Submarine Boats," which was followed by one by Mr. Dickie, Manager of the Union Iron Works of San Francisco, on "Torpedo Boat Destroyers." Mr. Dickie dwelt upon the importance of large and fast and thoroughly seaworthy boats of this class; boats that can act as scouts for a squadron, and he recommends a length of 250 ft. loaded, draft of 9 ft. 5 in., displacement 800 tons, h. p. 7,000, trial speed 25 knots. A 30-knot boat cannot be made stanch enough for cruising.

A discussion on torpedo boats developed a good deal of opinion to the effect that our torpedo boats had not been properly employed in the last war.

Perhaps the most important paper of the session was that by Chief Constructor Hitchborn, on "The New Warships for the Navy," the general features of which have been already described in the Railroad Gazette.

Foundations for the Post Office and Custom House at Chicago.

The difficulties in the way of securing proper foundations for heavy buildings in Chicago are now so widely known that the description of the foundations for the new Chicago Post Office and Custom House, by General William Sooy Smith, the engineer in charge, in the October Journal of the Western Society of Engineers, will be of more than local interest. The Diamond Board of Trade Building is cited as an instance of a Chicago structure which settled within a few years after completion and badly cracked. In this case during six years the total maximum settlement was 16½ in., and the minimum 8 in., which caused the building to crack so badly that portions had to be taken down.

The new post office building will weigh about 150,000 tons, and great care has been given to the design and building of the foundations. These consist of piles driven to hard pan, above which is wooden grillage, concrete and masonry. The following extracts are taken from the paper:

Preliminary borings made for the purpose of determining the quality of the soil underlying the site of the proposed building, resulted as follows: After boring through the filled material and sandy soil for about 12 ft. below the surface of the street, a layer of hard brittle clay, about 3 ft. thick, was struck. Below this to a depth of from 55 to 60 ft. below street level the clay was very soft, with spots of stiffer clay, and traces of gravel in places, but nowhere firm enough to sustain any considerable load. From the depth of 55 to 60 ft. the material grew harder gradually, with more gravel, until at the depth of from 69½ ft. to 71½ ft. below the street level, hard pan was struck, into which it was impossible to bore with a common wood auger.

From the borings it was determined that the length of piles in the foundations, to be cut off 26½ ft. below the street level, would be from 43 to 45 ft., provided they were driven to hard pan, so the plans were made for 50-ft. piles, to allow for slight irregularities in the top surface of the hard pan and the sawing off.

Excavations to a depth of 30 ft. below street grade verified these borings to that depth. The material is a blue plastic clay, weighing 136 lbs. per cu. ft. It contains some pockets of coarse sand and a few boulders of various sizes.

The piles, driven with square ends without sharpening, are cut off 26½ ft. below street level, or 12½ ft. below low water level of the lake. The thickness of the caps, 14 in., added to that of the platform resting on them, 12 in. thick, brings the top of the platform 2 ft. 2 in. above the tops of the piles and 10 ft. 4 in. below the surface of the lake at low water, insuring immersion at all times of the highest timbers in the foundation.

The foundations would have cost considerably less if the piles had been cut off 8 ft. higher, and the timbers would still have been 2 ft. 4 in. below lake surface and so perpetually wet. But in view of the possible disturbance of the foundations by the construction of subways in the streets, or by any other deep excavations in the immediate neighborhood made for any purpose, it was deemed best to cut the piles off at the lower level determined upon.

There are 5,087 piles, including 59 under the foundations for the sub-treasury vaults. They are of Norway pine, not less than 16 in. in diameter at the butt, and 10 in. at the point. They were driven by a steam hammer, the falling part of which weighs 4,700 lbs. and drops 42 in. The hammer frame and engine weigh 4,500 lbs. They were driven until it required from six to eight blows of the hammer to drive the pile one inch.

Each pile will sustain about 30 tons, which provides for a factor of safety of about 4½. The length of the

piles after being cut off varied from 42½ to 47 ft., and agreed well with the borings.

After the piles were sawed off at the proper grade, white oak caps 14 in. x 14 in. were placed on top of them, crosswise of the trenches, and bolted to the piles by means of 1 in. wrought iron driftbolts, 24 in. long, one in each end of every timber. On top of these caps was placed a solid platform of 12 in. x 12 in white oak timbers, the outside timbers of each platform being bolted to each cap timber by a drift bolt 20 in. long. The caps and platform timbers were all planed and sized to the dimensions given, to insure good bearings. On top of the platforms was placed a layer of concrete 3 ft. thick, composed of one part of Portland cement, two parts of sand and five parts of crushed stone. The cement was required to show a tensile strength of 250 lbs. per sq. in. in seven days, mixed in a proportion of one part of cement to two parts of sand. The concrete was all mixed by hand and the amount put in varied from two to three cubic yds. per man per day of 10 hours, depending on the distance of wheeling the material and concrete.

The cement and sand were first mixed dry, then water was added, and the stone was spread on top. The whole mass was then turned by shovels two or three times, and then shoveled into wheelbarrows or directly into the piers, where it was spread in layers about 6 in. thick, and thoroughly tamped.

The masonry was built of Joliet and Lemont limestone. The stone used varied in thickness from 10 in. to 30 in., and was dressed so as to make the joints not more than 1 in. The outsides of the piers and walls were left rough and in some cases extended several inches beyond the neat size of piers. The mortar used consisted of one part of cement to two parts of sand, the cement requiring the same test as the concrete. The stone was all laid by derricks.

The total quantities of materials handled and entering into the construction of the foundations and the unit prices were:

	Quantities.	Unit Prices.
Excavations, basement	22,267 cu. yds.	$0.33
Excavations, trenches	54,294 cu. yds.	0.34
Piles (50 ft. long)	5,087 piles	11.70
Timber capping	796,352 ft. B. M.	27.80
Concrete	5,122 cu. yds.	5 45
Dimension stone	284,144 cu. ft.	0.24
Rubble masonry	32,327 cu. ft.	0.16
Total contract price		$209,821.94

The rapidity with which pile foundations can be put in under the circumstances which exist in Chicago, is a strong consideration in their favor in this city of hurry and push.

A careful estimate of the cost of the foundations if wells, filled with concrete, had been employed, showed that it would have exceeded the contract price of the pile foundations by at least $100,000, and the excess of the estimate for the steel and concrete platform plan over the actual cost of the pile foundations would have been at least $25,000.

None of the circumstances pointing to the use of either of the other two plans existed in this case, and there was, therefore, no room for doubt as to which plan should be adopted.

The Boston Elevated Railroad.

The elevated railroad of the city of Boston is something which as yet exists only in name, but work was begun last Monday on the structure, which, when completed, will give to Boston facilities for rapid transit greatly superior to those now possessed.

The first work to be done is at City Square, Charlestown, where one terminus of the road will be placed. This has been delayed until the present time on account of work on the new bridge across the Charles River. The latter is now partially completed. Mr. H. P. North is the general contractor for this part of the work.

The conditions of suburban traffic in greater Boston are such as to bring together many of the lines at three points, namely, at the transfer stations at City Square, Charlestown; Harvard Square, Cambridge, and Dudley street, in the southern part of the city proper. These three points from the apexes of a nearly equilateral triangle in which is enclosed the business section of the city. From them, the branch lines which compose the Boston street railroads diverge in all directions. Inside the triangle the layout of tracks is extremely complicated and circuitous, making it difficult to get from any one of the transfer stations to a desired spot with any degree of rapidity. The proposed elevated structure will remedy this by providing what may be called three trunk lines running from the three apexes of the triangle to the center. This will allow the suburban passenger to utilize the faster elevated trains when he reaches his transfer station.

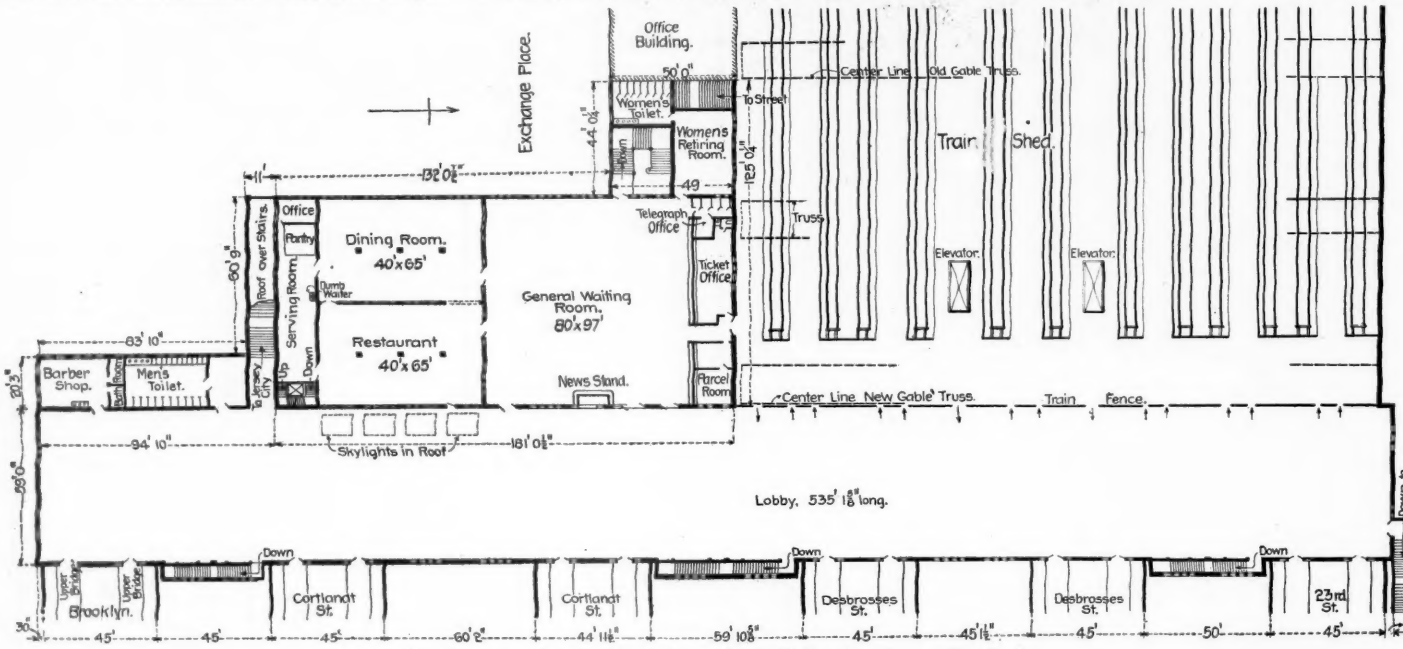
New Pennsylvania Passenger Station at Jersey City.

As noted in the Railroad Gazette of October 28, plans have been prepared for a new station for the Pennsylvania Railroad at Jersey City, and for an extension of the train shed 125 ft. toward the river, the improvement being made in consequence of the destruction of the headhouse by fire last winter. The plan of the new building, on the upper or track level, is shown in the accompanying engraving. The location of the ferry slips is also shown. The ferryboats running to Brooklyn, to Cortlandt street, New York, and to Twenty-third street, New York, carry passengers on their upper as well as their main decks, and the drawing shows the passageways to these upper decks. Stairways leading down to the approaches to the main decks are provided between the ferry slips as shown. The gable truss of the train shed is to be moved from its old location, as shown, and it will be the end truss of the remodeled shed, two new intermediate trusses being erected at the points indicated. The train shed, which is 256 ft. wide, will be 777 ft. long.

The general arrangement of the waiting room, dining room and restaurant is similar to that in the building destroyed, the new building being immediately south of the site of the old one. The entrance to the general waiting room for Jersey City passengers is by the stairway adjoining the women's room, and there is also a stairway at the south end of the station building, giving Jersey City passengers access to the upper decks of the ferryboats.

The new ferry house will have a steel frame, and the outer walls will have panels of "expanded metal of solid partitions." This will be covered on the outside with copper, and the inside will consist of ornamental staff panels. The walls will thus be fireproof and at the same time sufficiently flexible to withstand the shocks that are caused by boats striking the slips.

It will be seen that passengers going from the boats to the trains, and vice versa, may pass directly across the lobby, which is 59 ft. wide, without going through the waiting room.



New Passenger Station of the Pennsylvania Railroad at Jersey City, N. J.

The Purchase and Inspection of Supplies.

We recently gave an abstract of a paper by Mr. H. B. Hodges, Purchasing Agent of the Long Island Railroad, on the methods of purchase and inspection of supplies for railroads, and have also called attention to the paper editorially. The October Proceedings of the New York Railroad Club are now published, and below are some brief extracts from the discussion of the paper at the time of the meeting:

Mr. M. N. Forney—The fact has been impressed upon my mind that the business of railroad companies is that of carrying freight and passengers, and although there are a great many very able railroad people who differ from me in this, it has always seemed to me that it was not desirable for railroad companies to go into manufacturing business; and that if they confined their attention exclusively to carrying traffic, they would find that they had as much to do as it was possible for them to give attention to. It follows from this that if they should abandon manufacturing business and purchase their supplies, that they ought to know very clearly and very distinctly and very fully, exactly what it is that they need. This seems to be the one point in railroad organization which has been very much neglected. It is a point to which the greatest amount of attention should be given. This is a department in railroading to which you cannot give too much attention. It is a department which is generally supervised by low salaried men, men of limited experience often men fresh from the technical schools, not that I mean to disparage the value of technical education, but technical education in a department of that kind has not much value unless allied with ample experience.

That leads up to another matter, which is that of determining how to get the material to conform to the specifications. That means proper inspection, and it implies competent and honest inspectors. The persons in charge of the inspection department should be men, not of subordinate positions who are paid very low salaries, and who are young in years and young in experience; but they ought to be men of liberal salaries, liberal education and liberal experience.

Mr. L. R. Pomeroy—There is only one phase of the subject that I wanted to touch on, suggested by an item on the fourth page, as follows: "Purchasing agents are sometimes so situated that they are forced to buy the cheapest goods offered them, in order to make a favorable comparative showing for their department." And the query which has arisen in my mind is, how is it possible for a purchasing agent to make a favorable showing? How can you measure it? A certain superintendent of motive power was called to the general office to explain the amounts of his pay rolls, and the general manager with the pay roll laid out before him said: "How is it that your pay roll is decreasing, but your cost of material is constantly increasing?" They got down some of the previous rolls and compared them with purchases of material; the result was that for every dollar's worth of labor expended, a dollar and a half was spent for material, whereas, on the present pay rolls before them, with which he was finding fault, for every dollar of labor there was four dollars spent for material. So he asked the general manager, "What does it mean?" He replied: "Well, I guess that means you are getting more work out of the shop and more work out of the men." And I know for a fact that he had speeded up the tools considerably, introduced piece work and other labor-saving appliances, and was really utilizing four dollars' worth of material for every dollar's worth of labor. What sort of a commentary would such results be on a purchasing agent's comparative statement? How can the dollars and cents spent in his department be any criterion of the value of his services to the railroad?

Mr. Hodges—Mr. Pomeroy's point is entirely well taken. I should have perhaps qualified that statement. What I should have said was that the purchasing agent, by buying cheaper goods, will be able to make a temporarily favorable showing. If I had introduced the word "temporarily" I think my position would have been unassailable. For one particular article I am paying 50 per cent. more than my predecessor, and that article has not been in service long enough to show a saving. At the end of the first year the amount expended for that particular class of material was greater than in the previous year. In other words, the quantity purchased had not been sufficiently reduced on account of its greate

lasting qualities to make the total cost less. But I am convinced that at the end of the second year the amount paid out for that class of material, although at 50 per cent. higher price, will be less than in the year before I made the purchase. I think that what Mr. Pomeroy says would apply to nearly everything.

The President—Mr. Hodges, do you advise making yearly contracts for supplies that prevent the purchase of material or supplies from other parties, if lower prices and equally as good goods are offered you?

Mr. Hodges—I do not see how that is open to discussion. The purchasing agent makes a contract that is binding in law, and binding on him as a man of honor. The object of making a contract is to effect a saving, and in many cases a purchasing agent, by agreeing to purchase of a certain firm all of a certain class of material the road uses in 12 months, is able to get a better rate than he could by buying of different concerns at different times during that period. It does not seem to me that this contract principle would apply to every class of supplies, but in certain lines I think it a very good principle to follow, and I have followed it in a number of cases.

Mr. H. G. Prout—Of course Mr. Hodges' training has given a turn to his paper. Bred as an engineer he naturally realizes the value of an engineer as a purchasing agent, and, so far as I can judge, his view is entirely right. But I think that Mr. Hodges is one of very few purchasing agents in the country who have come through the gates of engineering.

As to whether or not it is better to buy on specifications or to go to some manufacturer whose product you have learned to trust, I question very much if a general rule can be laid down for that. I could mention to you a case of specifications for steel rails which did a great deal of harm in the world for many years. Those specifications were based upon elaborate tests and studies, and they affected the rails purchased by some great companies and the rails made by several rail mills, and they affected them in the wrong way. I could mention another case of specifications for steel rails which have done a great deal to raise the practice in rail mills. In other words, it depends upon the man who makes the specifications, and upon his knowledge and experience.

The application of the principle of buying on specifications is simply a step in the natural evolution of things. It is applying science. It is collecting the experience of other men, and bringing it together so that it will be useful to you in your own purchases. I should suppose that the theory of going to a man whom you have learned to look upon as a reliable manufacturer would be liable to considerable abuse, because the personal equation comes in there very strongly; and that if you have a thoroughly scientific and well founded scheme of specifications you would do better to buy on that.

Modern political economists are in the habit of saying that competition leads to very great evils, but after all, as Mr. Marshall has suggested, when you get to the bottom, competition is the very mainspring of human progress and we cannot get away from that. We have got to recognize the tremendous importance of that element of competition in the whole course of human progress. And so you cannot get away from the conclusion that we have all got to go to work and get the best specifications we possibly can, and then throw the whole thing open and let the other fellows fight and give us the best price they can under those specifications.

Mr. O. F. Nichols—There can be little doubt that the contract system tends to secure beneficial results in several ways. It tends to produce uniform results: it leads to the preparation of careful specifications, not perhaps the right ones at first, but it leads ultimately to the production of ideal specifications. Men meet at a common letting on a common equitable basis. The field is perfectly free and fair in a good letting; the material goes to the lowest bidder, and the contracts being let, the case is closed for a year and the defeated bidders have to hustle around to see how they can beat the ruling prices at the next year's letting, while the railway has only to determine by inspection that it gets the material contracted for.

Mr. Samuel Higgins—The paper by Mr. Hodges contains many valuable suggestions, and is worthy of careful study on the part of all railroad officials having anything whatever to do with supplies, and there are very few officials but do have more or less to do with that question.

I am very glad Mr. Hodges speaks of the necessity of the purchasing agent being in close touch with the different heads of departments. Where this is the case it must follow that supplies will be purchased that are better suited for the work, than where the purchasing agent goes ahead blindly, and is guided solely by the price. If purchasing agents would make it a point to visit the shops and other places where material is used, so as to see just how the material is handled, where it goes, etc., many questions which now bother them, as to why they should pay more for an article for which a cheaper substitute can be found, would be made clear.

Mr. Hodges' remarks in regard to buying under specifications are very good, particularly what he has to say as to submitting specifications before they are issued, to the manufacturers, for criticism. This has been a rule with me for some time past, and with good results.

The testing department is a good thing, but in my opinion can easily be run into the ground. I don't think, as Mr. Hubbell does, that the proper thing to do is to select some reliable manufacturer and put all your confidence in him, nor do I think, except on very large systems, that it is a wise thing to spend very much money on a testing department, but there is a happy medium between the two which we ought to strive for.

We have had some experience with stay-bolt iron of various qualities. Up to four years ago the road I am with bought stay-bolt iron, or what was called stay-bolt iron, at a certain price. We then commenced ordering stay-bolt iron costing three times as much per pound as what we had been using. Previous to the change we ordered on an average twelve tons of stay-bolt iron per month. Since the change we have ordered on an average five tons of iron per month, and the longer we continue using the more expensive iron, the less the amount ordered each month. Or, in other words, some time had to elapse before we really commenced to feel the effect of having the better iron for stay-bolts in the boilers. This reduction in the amount of stay-bolt iron ordered has occurred, notwithstanding the fact that there has been quite a large increase in the number of engines owned by the road.

Consolidation Locomotives for the Union Pacific.

The Brooks Locomotive Works has about completed the delivery of eight simple consolidation locomotives to the Union Pacific, and the Schenectady Locomotive Works two similar two-cylinder compounds. The designs were made under the direction of Mr. J. H. McConnell, the Superintendent of Motive Power of the road. The simple and compound engines are practically identical with the exception of the cylinders, and the general appearance is shown by the accompanying engraving, made from a photograph of one of the single expansion locomotives. This engine weighs about 145,000 lbs. in working order, and the weight on the driving wheels is 131,000 lbs. The cylinders of the simple locomotives are 20 by 24 in., and those of the compounds 22 and 34 in. by 24 in. stroke, while the driving wheels are 51 in. in diameter. The boilers are the same for all, and are of the wagon top type, designed to carry a working steam pressure of 180 lbs. per sq. in.; the tube heating surface is 1,910.8 sq. ft., the firebox heating surface 200 sq. ft., and the grate area 32.06 sq. ft. Noticeable features of these engines are the diamond stacks, which are standard on the Union Pacific, the location of the injectors on the side of the boiler outside the cab, flanged tires on all driving wheels and short front ends fitted with the latest form of spark arrester, designed by Mr. J. Snowden Bell. Mr. McConnell states that for the past 18 months he has been using successfully ten-wheel consolidation and six-wheel switching locomotives, having flanges on the tires of all driving wheels. Cast steel has been used for driving wheel centers and driving boxes, and malleable iron for steam pipes and eccentric straps.

The following is a list of the principal dimensions of the simple locomotives:

Consolidation Locomotive—Union Pacific.

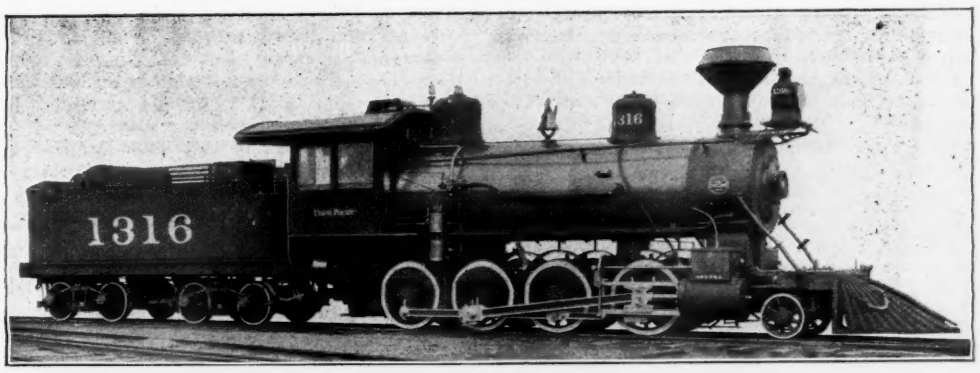
Gage	4 ft. 8½ in.
Simple or compound	Simple
Kind of fuel to be used	Bituminous coal
Weight on drivers	131,000 lbs.
" " truck wheels	14,000 lbs.
" total	145,000 lbs.
" tender loaded	80,000 lbs.
Wheel base, total, of engine	23 ft. 0 in.
" " driving	15 ft. 5 in.
" " total (engine and tender)	52 ft. 11¼ in.
Length over all, engine	38 ft. 9 in.
" " " total, engine and tender	65 ft. 0 in.
Height, center of boiler above rails	8 ft. 1½ in.
" of stack " "	15 ft. 6 in.
Heating surface, firebox	200 sq. ft.
" " tubes	1 910.8 sq. ft.
" " total	2,110.8 sq. ft.
Grate area	32.06 sq. ft.
Drivers, diameter	51 in.
" material of centers	Cast steel
Truck wheels, diameter	28 in.
Journals, driving axle, diameter	8 in.
" truck " "	5 in.
Main crank pin, "	7 in.
Cylinders, diameter	20 in.
Piston, stroke	24 in.
" rod, diameter	3¾ in.
Kind of piston rod packing	Metallic
Main rod, length center to center	10 ft. 5½ in.
Steam ports, length	17 in.
" " width	1½ in.
Exhaust ports, length	17 in.
" " width	3 in.
Bridge, width	1¼ in.
Valves, kind of	American balanced—Allen ports
" greatest travel	5½ in.
" outside lap	⅞ in.
" inside lap or clearance	0 in.
" lead in full gear	3/32 in.
Boiler, type of	Wagon top
" working steam pressure	180 lbs.
" material in barrel	Carbon steel
" thickness of material in barrel—	⅜ in., 5/16 in. and ½ in.
" diameter of barrel	64 in.
Seams, kind of horizontal—	Quadruple and quintuple riveted
" " circumferential	Double riveted
Thickness of tube sheets	½ in.
" crown sheet	5/16 in.
Crown sheet stayed with	⅞-in. bolts
Dome, diameter	32½ in.
Firebox, length	8 ft. 11 in.
" width	3 ft. 4¾ in.
" depth, front	67⅝ in.
" back	67⅝ in.
" material	Carbon steel
" thickness of sheets	5/16 in.
" brick arch?	Yes; on water tubes
" water space, width—	Front, 4 in.; Sides, 4 in.; Back, 4 in.
Grate, kind of	Rocking
Tubes, number	272
" material	Charcoal iron
" outside diameter	2 in
" length over sheets	13 ft. 6 in.
Smokebox, diameter	66⅝ in.
" length	47½ in.
Exhaust nozzle	Double
" "	Permanent
" " diameter	3½ in.
" " distance of tip below center of boiler,	23¼ in.
Petticoat pipe.	
Stack	Diamond pattern
" least diameter	18¼ in.
" greatest diameter	40 in.
" height above smokebox	4 ft. 6¾ in.

Tender.

Type	8-wheel
Tank capacity for water	4,000 gal.
Kind of material in tank	Steel
Thickness of tank sheets	No. 6 and No. 8
Type of under-frame	White oak
Type of truck	Diamond frame
Type of truck spring	Double elliptic
Diameter of truck wheels	33 in.
Diameter and length of axle journals	4¼ in. x 8 in.
Distance between centers of journals	6 ft. 3 in.
Diameter of wheel fit on axle	5⅝ in.
Diameter of center of axle	4¾ in.
Type of truck bolster	Steel
Length of tender frame over bumpers	23 ft. 9 in.
Length of tank	22 ft. 0 in.
Width of tank	8 ft. 0 in.
Height of tank, not including collar	4 ft. 0 in.
Height of tank over collar	5 ft. 0 in.
Type of back drawhead	M. C. B. coupler
With or without water scoop	Without

Special Equipment.

Tires	Midvale Steel Co.
Sight-feed lubricators	No. 9, Nathan Mfg. Co.
Safety valve	2—2½-in., Ashton Valve Co.
Injector	2—No. 10, Nathan Mfg. Co.
Driver brake equipment	Westinghouse
Tender brake equipment	"
Driver brake shoe	Ross-Meehan
Air pump	9½ in.—Westinghouse
Steam gages	6¾ in.—Starr Brass Co.
Piston rod packings	C. C. Jerome
Valve " "	C. C. Jerome



Consolidation Engine for the Union Pacific.

Foreign Railroad Notes.

No less than nine employees at one of the Berlin freight stations have been arrested, charged with a conspiracy for stealing freight. Most of them have been for years in the service. Crimes of this kind have very rarely occurred in Germany.

The Kraus & Co. Locomotive Works, which has shops at Munich, and also at Linz, on the Danube, has supplied 74 locomotives for Japan. This company makes a specialty of small locomotives.

The beet-sugar industry makes great demands on the railroads, as the beets are carried considerable distances to the sugar mills, and all within a limited period in the fall when other traffic is heaviest. The periodical "car famines" in Germany are always largely charged to this special traffic. This year in Prussia it was estimated that some 1,820,000 tons of beets would need transportation within 25 working days in October.

The Transportation Department of the Paris World's Fair will have its exhibits not at the west end of the city, where the chief buildings of the fair are to be, as at other Paris world's fairs, but at Vincennes, the extreme eastern end of the city, where plenty of room can be had for track, etc.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY.
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

It is gratifying to observe that mercantile associations see the need of action to relieve interstate commerce from the burdensome restrictions of the anti-trust law. The Directors of the Philadelphia Trades League have before them a report from their freight committee setting forth that:

"The method of doing business to-day is largely upon the basis of competition between cities. Upon this theory the city best equipped for obtaining rates favorable to its interests would have a decided advantage over a competing city. For this reason we believe if the various rates made by railroad companies can be maintained upon a parity as to the conditions existing in the various cities; that a merchant is in a better position to compete for business with his rival knowing just what rates can be obtained by his competitor to a given point. We, therefore, believe we should use every legitimate means to secure uniformity of rates by some legislation, and at the same time protect the merchants from exorbitant rates. There is no doubt that an effort will be made during the next session of Congress to secure legislation which will permit railroads to pool their earnings, and it is the duty of this organization to see that whatever legislation is enacted will at the same time protect commercial interests from any unjust discrimination on the part of carriers."

The "unjust discrimination on the part of carriers" which is now prominently before the public, is that by which shippers of large quantities of freight get secret reductions which are unlawfully withheld from shippers of smaller quantities. A law which will stop secret reductions is the only legislative remedy that can affect this evil, and it is to be hoped that our Philadelphia friends are fully aware of the impotence of both the Sherman law and the anti-pooling law in this respect, and the consequent necessity of replacing them with something better.

To the railroads the wreck of the traffic associations leaves open two obvious courses. They may give up all attempt to control rates through consultations and concerted action, and leave matters to drift into still further demoralization. After a time we may suppose that the owners of the securities of the railroads and those shippers and traders who feel the evils of the resulting abuses would unite to help the railroad officers to arrive at some other method of controlling rates. On the other hand, railroad officers and some of the bankers most immediately interested and some of the strongest security holders, may agree to proceed with a concerted campaign of education which shall gradually affect Congress and thus bring about some kind of a law that will be acceptable to all parties. In such a campaign the co-operation of such bodies as the Philadelphia Trades League and the now numerous bodies of similar character in other parts of the country is highly important; and probably it is essential. Perhaps it is not too much to hope that in such an effort many of the associations of business men and shippers in the West, as well as in the East, can be brought to act with the railroads. It does not seem likely that any modification of the pooling clause of the Interstate Commerce Act can be passed except by the concurrence and compromise of the railroad companies, the business men's associations and the Interstate Commerce Commission.

The editor of Bradstreet's seems to think that the evil of rate cutting will have to get worse than it now is before shippers will discover that their own interests are seriously affected by it. He says:

"There is a general idea that the business public will be eager for action by Congress which will enable the railroads to make and maintain stable rates. This, however, seems to rest on the assumption that rates will become so irregular and unsteady that shippers will cry out to Congress for relief. . . . There does not seem to be much chance of securing the necessary attention of the national legislature to such a bill at the short session of Congress. Nor in the few months following the abandonment of traffic organizations can it be supposed that the business public will become so impressed with the evils of the situation that an overwhelming sentiment in favor of some concession to transportation interests will develop. Justifiable as the claim of the railroads for protection is, it will require time for the questions involved to become thoroughly digested and for public opinion to crystallize. In fact, it may be deemed well for the railroads themselves to stand in the background and not to make an organized application to Congress as they have been expected to do."

True, it may require time for the public to digest facts and crystallize its opinions; but no time should be required to find the necessary facts. Honest shippers would "cry out" to Congress now, if they would only look at the facts and see how the law-breaking shipper is constantly getting the better of those who are law-abiding. Rates may possibly be forced lower, but they cannot be made any more inequitable, as between competing shippers, than they are now. It is not, perhaps, to be expected that a very large part of the public will be "eager" to secure stable freight rates, for the great majority of merchants and manufacturers seem to have but an imperfect appreciation of the advantages of open and stable rates. Of course some merchants are making money by secret rates, and will not admit the desirability of regular and stable tariffs. As to the suggestion that the railroads should stand in the background, it seems to us that they—or some of them—have done too much of that already, having stood pretty effectually behind the obstructionists.

In another column of this issue Mr. Milton H. Smith, President of the Louisville & Nashville, gives his view of the proposition that the railroads shall acquiesce in a law to give the Interstate Commerce Commission power to prescribe rates for the transportation of freight and passengers. Some competent observers believe that it will be necessary for the railroads to cease their opposition to such a law before it will be possible to secure the passage by Congress of any bill to ameliorate the present intolerable condition of things. Mr. Smith believes it wise to keep up the opposition. This position is not a new one for him, but he sets forth his opinions with more vigor and directness than in former utterances. The substance of his argument is that as railroads in the past have cut rates in spite of the existence of pools they would do so now; and that the Commission could make no effective use of the power to prescribe rates because it has failed to detect offenses against the present law. If it cannot find out (and prove in court) whether a particular railroad is or is not cutting below its published tariffs, what difference does it make whether the tariffs be high or low? If railroads will daily violate the law now, they would with equal facility violate a contract with a competitor. By exercising good sense and common honesty they can at once stop the prevailing demoralization of rates and restore their revenue. We shall not now undertake to analyze or criticise Mr. Smith's contention. The question at issue is a good deal complicated by the effect that Federal laws have on thousands of miles of railroad where good sense and honesty have not been thrown to the winds, and by the possible power that the Commissioners might have under a new law to prevent advances in rates. But it should be noted that our correspondent drops his argument before he has finished it. Good sense and honesty are needed, but how are we going to get this warranted remedy adopted? Men cannot be made honest by mere legislative enactment. Logically, Mr. Smith should go on and adopt the view of Mr. Ingalls, who advocates the abolition of the imprisonment law and the infliction of money penalties (on the companies, not on the agents) for all deviations from legal tariffs. He would give up trying to punish the shipper, hoping thus to get his aid in punishing the railroad. The success of Mr. Ingalls' plan would not insure the conversion of dishonest men into honest ones; but, presumably, he would expect to drive the dishonest ones into the poor house by the enormous fines that he would pile up against them.

The Design of Suspension Bridges.

In another column will be found an article by Mr. Francis Collingwood, which gives a clear and concise account of the circumstances that led to the buckling of the lower chords of the trusses of the Brooklyn bridge on July 29. While the Brooklyn bridge is unique by reason of being the longest and heaviest suspension structure ever built, there are many details of its construction which are not generally known, for, strange to say, no monograph has been published setting forth a complete history of its design and erection. The figures accompanying Mr. Collingwood's article render plain the manner in which the stays are attached to the towers, and will be studied with interest by all bridge engineers who have previously been unacquainted with these details.

The cause of the buckling in the lower chords of the trusses is now plainly seen to be due to the horizontal component of the tension in those stays which were attached to the bosses shown in Fig. 6. All stays longer than these are carried in grooves across the towers to the land spans and thus are movable on the towers like the cables. When the heavy live load was brought on the southern roadway the deflection of the central part of the river span was increased by the inward motion of the cables and the longest stays, and accordingly an excess of load was thrown on the fixed stays, Nos. 13 to 16. The stresses in these were thus abnormally augmented, and the sum of their horizontal components, acting along the lower cnords, proved sufficient to cause lateral buckling. It is extremely fortunate that none of these fixed stays or corresponding suspenders broke under the high tensile stress; had one suddenly failed, and then another and another, the load might have been sufficiently transferred from the cables to the trusses to cause a serious disaster.

The bridge was not designed to carry such a heavy live load, and the fact that something happened when it was applied is not at all strange. The Brooklyn bridge, like all other structures, can be broken under a load of sufficient intensity, and the unusual live load of July 29 severely strained it, so as to cripple it in its weakest point. As soon as the chords buckled the tension in the adjacent stays began to be relieved, the live load became more uniformly distributed to all the suspenders, and the danger was over. The buckling of the chords was indeed a fortunate occurrence, for this prevented the neighboring stays and suspenders from becoming overstrained.

This accident, now that its causes are clearly understood, should teach some useful lessons regarding the design of suspension structures. The Brooklyn bridge is a triply-composite construction; that is, it is so arranged that there are three ways in which the weight of a car on the main span may be transferred to the towers; first, through the suspenders and cables, second, through the trusses, and third, through the stays. As a matter of fact these three act together, each carrying a part of the weight, and upon the proper design and adjustment of each system with respect to the others the efficiency of the bridge depends. Even prior to the erection of the bridge it was recognized that the stays introduced some elements of uncertainty, and Mr. William Hildenbrand, writing in 1877 in Van Nostrand's Engineering Magazine, concluded that their principal office should not be to support weight, but to stiffen the floor. At the same time the part of the load that he apportioned to the stays was about 22 per cent. of the total, and he claimed that this result would be secured by forcing the cables, through a proper adjustment, to take the exact curve designated in the computations. Whether such an adjustment has ever been made we have no means of knowing, but certainly such an operation would be a delicate and a difficult one.

The theoretic complications introduced by stays are so numerous that probably no engineer would now venture to use them, even for the sake of stiffness. Professor DuBois, in his "Framed Structures," points out their disadvantages and advises that they should be abandoned; Johnson and Bryan, in their "Modern Framed Structures," show that the maximum unit-stresses in stays are independent of their size; Merriman and Jacoby, in their "Higher Structures," claim that it is impossible for the stays in the Brooklyn bridge to carry the part of the load assigned by the designers. The various plans for a suspension structure across the Hudson River contain no stays, and the two boards of engineers who reported on this problem in 1894 are unanimous in discarding the stay system. Notwithstanding this consensus of modern opinion it should not be thought that any error of judgment was committed by Roebling when he designed the Brooklyn bridge with a stay system as well as a truss system. We must remember that the modern suspension structure is not yet 50 years old, and that the stiffening truss was first introduced by Roebling in the Nia-

gara bridge. Even 20 years later, when the preliminary designs of the Brooklyn bridge were being made, the full value of the truss was not realized, and hence it was most natural that the stay system should have been retained. To-day, however, it is well established that the two systems of cable and truss should not be complicated by the addition of a third system.

Another question in the design of suspension structures is whether the truss shall, or shall not, have a slip joint at the middle. Those who favor the joint say that the stresses are more determinate, and that the effects of temperature are mostly eliminated. Those who are opposed to the joint, and in favor of a truss with continuous chords, say that the former does not avoid temperature stresses, and that the latter is stiffer and better distributes the live load to the cables. Roebling used the continuous truss in the Niagara bridge, and the jointed one in the Brooklyn bridge, and it is still an open question which is preferable. The accident throws little light one way or the other upon this matter. It should, however, be observed that when a truss is built with a slip joint it should be maintained in efficient adjustment, and this was not the case in the Brooklyn bridge on July 29. It is known that the distribution of stresses is different for the two types of trusses, and if the jointed truss becomes turned into a continuous one, as appears to have been somewhat the case from Mr. Collingwood's account, the conditions that prevail are not those contemplated in the design. It does not appear that this defect contributed in any way to the buckling of the chords at the places where failure did occur, but it certainly produced unusual stresses in the chords near the middle of the span.

The lessons taught by this accident in regard to the design of long suspension bridges may be summed up in the statement that simplicity is preferable to complexity. Two systems are better than three, because the third tends to complicate and render less definite the action of the others. Of the three systems, that of the stays is the least efficient, and hence it should be no longer used. If a continuous truss gives more determinate stresses than a jointed one it is to be preferred; if a jointed one is used, care should be taken that the joint is always in action under changes of temperature as well as under the stresses due to live loads. In all the history of American bridge design there has ever been a progress away from complex systems to those that are statically determinate, and perhaps the time may come when the cables and trusses of a suspension structure may be so arranged that this desirable end may be fully secured, and the proportion of load which is borne by each can be computed in advance with certainty and exactness. When this is done, if it can be done, the rational and economic design of suspension bridges will have attained its full perfection.

It is to be hoped that the engineers in charge of the Brooklyn bridge, or men like Mr. Collingwood and Mr. Hildebrand, who rendered such valuable services during its erection, may find time to prepare an exhaustive monograph giving the theory and details of its design, as well as the history of its construction and maintenance. The Washington bridge has had its history ably written by Mr. Hutton, and the St. Louis Bridge by Mr. Woodward. Certainly New York should see that a permanent record of its great suspension bridge is prepared and published. When this history appears, let us hope that it may contain an extended discussion of the actual stresses, due both to the unusual live load and to the high temperature which prevailed in the cable, suspenders, stays and trusses on the memorable afternoon of July 29, 1898.

A Russian journal notices that while other European nations have invested capital largely in Russian enterprises, the Germans stand aloof. Yet the Germans are much more familiar with Russia and the Russians than any other foreigners. For centuries they have largely supplied Russia with skilled workmen, and many have settled there permanently and raised families of good Russians. Naturally, as its nearest neighbor, Germany has been a leading customer for Russian produce and has supplied largely the Russian demand for manufactured goods. But while the English have bought the Russian oil wells, Belgians and French the coal mines of South Russia, and to a great extent the gold mines on the Ural, and the English have established steam navigation to the mouth of the great Siberian rivers, the Ob and the Yenissei, German capital is hardly known in Russia. Can it be that the Germans keep their capital out of Russia because they know it so well?

The Siberian Railroad is not fairly opened to Irkutsk, and already a commission of engineers has reported that it needs strengthening in order to be fitted even for moderate speed. The average speed of trains is now, they say, about 13 miles an hour. They recommend that the number of ties per rail-length be increased from 12 to 14, with a chair or plate between rail and tie, and so the road be fitted for ordinary speeds of 23 miles an hour and a maximum of 36 miles. The rails weigh only about 50 lbs. per yard. Moreover, as the stations are on the average some 30 miles apart, the commission recommends the building of passing tracks between sidings.

NEW PUBLICATIONS.

Hydraulic Cement.—The Properties, Testing and Use. By Frederick P. Spalding, Assistant Professor of Civil Engineering at Cornell University. Duodecimo, 265 pp. New York: John Wiley & Sons. London: Chapman & Hall, Ltd., 1897. Price, $2.00.

As cement should remain under water for some time before being tested, we have adopted a similar method in examining this book, and have allowed it to "set" for over a year on the editor's desk among articles of an aqueous nature, at least we hope they are not dry.

In quality the book might be classified with good natural cements. It has fair strength, good soundness, is not dense and is easily permeable. The author considers the cement in its manufactured state, and little information beyond a mere statement of facts is given about its production from the limestone. This has probably been considered beyond the scope of this work, but it seems to us that a few pages on this subject would add considerably to the value of the book. The first chapters describe and classify the various limes and cements. Their properties and the effects of the presence of various elements and compounds, as magnesia, calcium sulphate, etc., are considered.

The part of the book on tests and testing machines is treated at greater length. Beginning with the making of briquettes, the student is taught how to test cement for strength and for soundness; the former by tensile, compressive and transverse tests, the latter by the usual way of observing the appearance of thin pats of the cement after exposure to the action of water and air, also by noting the effect of steam and kiln drying and the expansion of the cement with increasing temperature. A number of special tests are given, for adhesion, abrasion, porosity, permeability, etc.

Following the subject of tests is a chapter on mortar and concrete; the kinds of materials to be used, their proportions and mixing are specified. At the end of the book is an appendix giving the specifications for cement required in some railroad, municipal and government work, thus giving the student an idea of the present practice of representative engineers. Some of the most interesting parts of the book are the recommendations of the recent commissions appointed in Europe for the study of the methods of testing materials, which are fully given as far as they relate to cement; while American views are found in the recommendations of the committee of the American Society of Civil Engineers, and in the opinions of the author and other individual investigators.

It is not to be expected that by reading the book one will become an expert on cements, as, like most things, this requires practice and experience; but it will give the student that which cement is commonly used for—a good foundation for further work.

Quantity Surveying for the Use of Surveyors, Architects, Engineers and Builders. By J. Leaning. Third edition, revised and enlarged. New York: Spon & Chamberlain; London, E. & F. N. Spon. Price $5.00.

In this country the science of taking off quantities for estimates may be said to be inchoate, excepting in certain special trades or practices; in England and other English speaking countries this is not the case, and the science of measurement of nearly all details of material that is used in the building art has found expression in conventional systems and Board of Trade rules. In those countries such a work as this becomes a necessity, and in the field which it occupies this volume stands possibly first. It is at once a guide and textbook and work of reference, and contains upward of 500 pages, carefully indexed.

Besides this it exhibits the art of keeping books of material accounts as they should be kept, and simplifies that sort of bookkeeping. Although there is much detail involved in this presentation that as yet scarcely finds a place on this side of the water because of our different customs of trade and building, yet it contains, besides the forms, so much of the germ of the best and most modern English practice that it cannot fail to be instructive and helpful to the American engineer and architect. Various mind-saving expedients in taking off quantities, and especially in checking and cross-checking quantities, are made use of, and any accountant who has much to do with figuring of this description would find profit in studying and referring to the conventional forms and methods employed in the book.

George's Pocket-Book of Calculations in Stresses, etc. New York: Spon & Chamberlain. Price $1.40.

To the discriminating user, this conveniently arranged little pocket-book may often be of no little value. It is a compilation of numerous examples of computations and their methods, such as arise in the daily work of the engineer, and, as the author well says in the preface, many questions so arise, of a simple nature in themselves, but still puzzling to the student or the engineer, that cannot always be quickly solved without actual examples worked out to refer to, and it has been his aim to supply this deficiency. In some directions he has succeeded well, though the small size of the work and its wide range naturally preclude much that might otherwise be looked for, and in that respect it is disappointing. Moreover, in some features it is better suited to English practice, for which it was originally prepared, than to American. But it has two attributes of value, suggestiveness and accuracy in principles. It does not affect to be either a textbook or a vade mecum; it is simply a reference book which, while it may not supply all the knowledge that the tyro may find necessary to its understanding, will not be likely to lead him into mistake or make a charlatan of him. The working engineer will find it handy to have about. The author is Mr. E. Monson George, M. Inst. C. E.

Lecture Notes on the Theory of Electrical Measurement.—By Prof. William A. Anthony. New York: John Wiley & Sons; pp. 85, 7 x 4½ in. Price, $1.00.

This book has been prepared for the third year classes of the Cooper Union Night School of Science, but is not intended to relieve the student of the necessity of taking his own notes of the lectures. The purpose of the notes is to furnish the student with a systematically arranged list of the topics treated in the lectures, and to give in full such facts, data and coures of reasoning as are not readily mastered by the student in the lecture; in short, this book is intended to aid the student in those matters which he is likely to find most difficult or which he may fail at the moment to fully grasp.

The notes cover nearly all of those elementary electro-technical subjects which the student of science or the electrical engineer should have at his command. Beginning with the fundamental conceptions of units, matter and motion, he leads up to more practical applications of the electrical science. At the end of many of the chapters are given practical problems, designed to test the knowledge of the student and his ability to rightly interpret the meaning of the formulas. The book should prove of great value to students, but it should not be inferred that it can take the place of a text book.

The Theta-Phi Diagram. By Henry A. Golding, A. M. I. M. E. Manchester, England: The Technical Publishing Co., Ltd.; pages 127; 7 in. x 5 in.; illustrated. Price, 3s. net.

This book is a contribution to the entropy temperature method of graphically solving thermodynamic problems. It has been the effort of the author to collect the scattered information about the subject and produce a work which treats the matter in a comprehensive way, bringing it up to date so far as published material will allow. The author first takes up the discussion of entropy and compares the indicator diagram with the Theta-Phi diagram. He follows this with some of the simple cases in heat engine analysis, and each problem which is considered is brought to a practical working basis. Hot air engines, gas engine trials and the entropy diagram for steam working under different conditions are given in some detail. The graphical solutions which are used freely add weight and value to the work which descriptive matter alone could not give.

In the appendix a table is given of dry saturated steam for pressures up to 219 lbs. per sq. in.

TRADE CATALOGUES.

Recent Locomotives.—As many of our readers know, the Baldwin Locomotive Works is issuing a series of pamphlets, being a record of recent locomotive building. It gives engravings from photographs of locomotives and extracts from the descriptive specifications. The last pamphlet received, being No. 8, dated October, contains 15 locomotives, including one six-wheel coupled, double ender for the Government of Victoria, simple, also one compound; one compound consolidation for the Chinese Eastern, one compound six-coupled for the same road, one compound consolidation for Russia and a double-ender, four-coupled, for the Lincoln & Barnstaple Railway of England.

"History of the Railroad Ticket" is the title of a little pamphlet by Robert S. Gardner, President of the Rand-Avery Supply Co., Boston, which has been printed for private circulation. Mr. Gardner is an "old-timer" in the light railroad supply business and he gives an interesting narrative of the work of the first ticket printer in England, Thomas Edmondson, of Lancaster (1836), and his ticket case, dater and numbering machine. He gives equally readable facts about Sanford, Warren & Harround, George Bailey and other early American printers and inventors. The pamphlet contains a dozen facsimiles of old

tickets, colored to correspond with the color of the paper of the originals.

Steel Making.—The Crescent Steel Co., of Pittsburgh, sends us a pamphlet describing the plant, the methods and the product of that famous concern. The pamphlet is illustrated by many pretty halftone engravings, made by the Pittsburgh Photo Engraving Co., the press work being by the Duquesne Printing and Publishing Co. Besides being interesting in its matter the pamphlet is a good example of fine work on the part of the printer.

The Hancock Inspirator Co., of Boston, Mass., issues a small illustrated pamphlet designated as "98—C," in which is described the Hancock inspirator. The apparatus is shown in sectional and detail views and a price list is given for the inspirator complete and for the different parts. This pamphlet contains the revisions of the capacities of the stationary pattern and types "A" and "C" inspirators.

The Gates Iron Works, Chicago, has just issued a new general catalogue of 127 pages, showing different styles of rock and ore crushers, stamp mills and machinery used for mining, milling and smelting ores. In addition to the general catalogue fourteen special catalogues have been issued, which describe in detail the various classes of machines shown in the general catalogue.

Electric Power Machinery.—The Crocker-Wheeler Electric Co., 39 Cortlandt street, New York City, has issued Bulletin No. 7, in which is given illustrated descriptions of the Crocker-Wheeler apparatus at the New York Electrical Exhibition. Direct dynamos and motors, elevator motors and machinery and generating machinery are described in detail.

Schoen Pressed Steel Body Bolsters.

It appears that because of the difficulty in calculating the deflection of body bolsters with any degree of accuracy, and of reproducing in the laboratory even approximately the conditions of service, the only guide at the present time in the design of such bolsters is the experience gained by actual practice. For this reason the proportions of the pressed steel bolsters shown by the accompanying engravings are of especial interest, as we are informed that large numbers of the several sizes have been used without showing appreciable deflection or permanent set, thereby allowing the side bearings to come in contact. For these bolsters soft open hearth steel, having a tensile strength not to exceed 63,000 lbs. per sq. in., is used. Mr. Charles T. Schoen, who designed the bolsters, states that as the result of actual trial he has found that with this material there is no appreciable deflection and no permanent set when the maximum fibre stress does not exceed 12,000 lbs. per sq. in., thus providing a factor of safety of a little more than five.

Figs. 1, 2 and 3 show the body bolsters used with flat bottom cars where the bolster is entirely below the sills. These in each case consist of a trough shaped piece with wide flanges, to which is riveted a top cover plate, making a very flexible design, in which different degrees of strength can be got by varying the depth of the girder, the width of the top flange, and within limits the thickness of the material of the trough. The sections from the center out are proportioned so as to have approximately uniform strength, this being done by decreasing the depth of the girder.

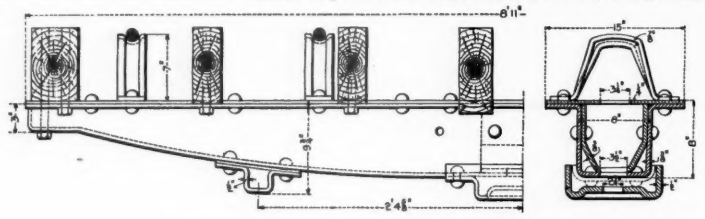


Fig. 1.—Body Bolster for 60,000 lbs. Capacity Car.

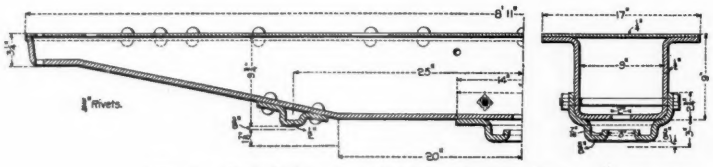


Fig. 2.—Body Bolster for 80,000 lbs. Capacity Car.

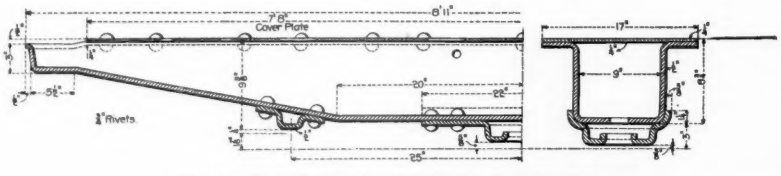


Fig 3.—Body Bolster for 100,000 lbs. Capacity Car.

The bolster for 60,000 lbs. capacity cars is pressed out of ⅜-in. steel, is 8 in. deep at the center and has riveted on top throughout its entire length a ¼-in. steel cover plate 15 in. wide; the maximum fibre stress is 11,000 lbs. per sq. in. For cars of 70,000 lbs. capacity a similar bolster is used, in which the girder or cover plate is increased sufficiently to give a maximum fibre stress of 12,000 lbs. per sq. in. For cars of 80,000 lbs. capacity the bolster shown in Fig. 2 is used. This is pressed out of ½-in. steel, is 8¾ in. deep at the center, and has a ¼-in. cover plate 17 in. wide, which extends to within 9 in. of the ends; in this bolster the maximum fibre stress does not exceed 11,000 lbs. per sq. in. The 100,000 lbs. capacity bolster is similar to the last, excepting the depth at the center is 9 in., and the cover plate extends to the ends, the maximum fibre stress being about 11,000 lbs. per sq. in. In all of these pressed steel is used for side bearings, truss rod supports and center plates, and the distance between the body and truck bolsters is 3 in.; ¾-in. rivets are used throughout.

The body bolster, Fig. 4, used with the recent 100,000 lbs. capacity hopper bottom steel cars, differs from the usual practice, as it is placed on top of the sills instead of the latter resting on it. With these cars no intermediate sills are used, and the spaces between the side and center sills and the space between the center sills are filled with flanged steel diaphragms, placed 7½ in. apart and riveted to the sills. The bolster, which is also of pressed steel, is securely riveted to the diaphragms below, as well as to tie plates at either end, which in turn are riveted to the side sills and the ends of the diaphragms. The whole construction is virtually a girder about 22 in. deep at the center, in which the maximum fibre stress is less than 9,000 lbs. per sq. in. This last design also shows how readily pressed steel lends itself to compact construction, permitting the designer a wide choice in the distribution of the material.

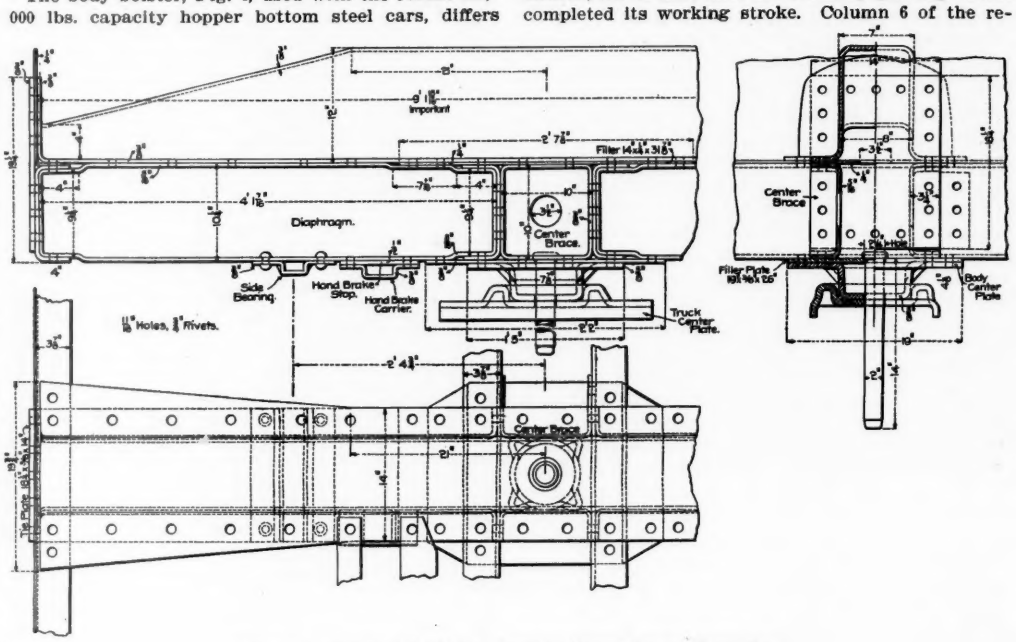


Fig. 4.—Bolster for 100 000 lbs. Capacity Hopper-Bottom Steel Car.

Explosive Mixtures of Illuminating Gas and Air.

Last year a few experiments were made at the Massachusetts Institute of Technology on explosive mixtures of illuminating gas and air. The cylinder used for the explosive mixture was first thoroughly cleared, and the connections between the cylinder and the atmosphere, and the cylinder and the power pump were then closed. A carefully designed apparatus made it possible to regulate accurately the percentage of mixture of the gas with the air. To determine what mixtures had the greatest capacity for doing work, suppose 1 cu. in. of illuminating gas to be used in each of the mixtures, 1—3, 1—4, 1—5, etc., then they would measure 4, 5, 6, etc., cubic inches. Let them be placed in cylinders of 4, 5, 6, etc., sq. in. piston area, the pistons will be displaced 1 in. from the bottom of the cylinder. If the pressure on the piston were the same, equal movements of the piston would give equal power; if, therefore, the mixtures gave equally good results, the mean pressure multiplied by the piston area will in all cases be the same.

The mean pressures were obtained from plotting the cards on co-ordinate paper, the same scale being used in all cases. The first fifth of a second only was considered, for in that time the ordinary gas engine has completed its working stroke. Column 6 of the results of the tests, given below, which are taken from the Technology Quarterly, show the relative power of the mixtures. By a similar line of reasoning we obtain column 12 of the table. As the method here employed is applicable in other cases, it is possible to compare the relative value of any similar explosive mixture.

Results of Tests on Explosive Mixtures of Illuminating Gas and Air.

Mixture. (By parts.)	Maximum pressure. (Lbs. per sq. in.)	Time of explosion. (Seconds.)	First 1/5 second.				1/5 second after maximum pressure.				
			Area. (Square inches.)	Mean pressure. (Lbs. per. sq. in.)	Mean pressure. Divided by proportion of gas.	Final pressure.	Area (Square inches)	Mean pressure. (Lbs. per sq. in.)	Mean pressure. Divided by proportion of gas.	Final pressure.	Final pressure Divided by proportion of gas.
1	2	3	4	5	6	7	8	9	10	11	12
Gas-air											
1—3	45	.49	0.32	11	44	26	1.30	43	172	40	160
1—4	86	.08	1.77	59	295	61	1.88	62	310	46	230
1—5	96	.05	1.86	62	372	52	1.93	64	384	44	264
1—6	88	.05	1.80	60	420	54	1.93	64	448	46	322
1—7	86	.06	1.97	66	528	58	1.93	64	512	48	384
1—8	87	.06	1 71	57	513	53	1.83	61	549	46	414
1—9	77	.08	1.60	53	530	57	1.86	62	620	46	460
1—10	71	.11	1.36	45	495	56	1.69	56	616	45	495
1—11	68	.14	1.21	40	480	60	1.66	55	660	43	516
1—12	39	.33	0.35	12	156	29	0.98	33	429	30	390
1—13	32	.42	0.18	6	84	16	0.79	26	364	24	336
1—14	9	.42	0.05	2	30	4	0.24	8	120	8	120

Cost of Carrying Mail on the Southern Pacific.

At the hearing in San Francisco before the subcommittee of the Joint Committee, appointed by Congress to investigate the postal service (see Railroad Gazette, May 6, p. 322), testimony was heard from Herbert P. Thrall, Superintendent of Railway Mail Service; John P. Young, Managing Editor of the Chronicle; James J. Valentine, President of Wells, Fargo & Co.; Thomas Mellersh, Secretary and Controller of the San Francisco & North Pacific Railway; Julius Kruttschnitt, Vice-President of the Southern Pacific Co., and Henry A. Bowen, President of the Sierra Valleys Railway.

Mr. Thrall testified as to the compensation allowed the Pacific Coast railroads. On the San Francisco-Ogden route (Southern Pacific) he stated that the annual compensation for the 833.88 miles was $486,244; average weight of mail carried the whole distance daily, 43,632 lbs.; rate of pay per mile per annum, $583.11; rate of pay per lb. carried $0.01336; rate of pay for one lb., $0.0000427*. He said that the department needed more space in cars for distributing papers. At present they had to store part of the mail in the baggage car while the other part was being "worked."

Mr. Young endeavored to substantiate the statements which he had printed to the effect that the railroads were getting too much pay, more in pro-

*The second item, "per pound carried," is divided by 313, the number of week-days in a year, to get the third item (.00427 cent), which, multiplied by 2,000, will give the average ordinary used for freight by railroad accountants; that is, the average per ton per mile for the total weight carried. This product is 8.54 mills. This is 2.24 mills larger than the average given by Mr. Kruttschnitt in his testimony. The discrepancy is probably explanable by the deductions made by Mr. Kruttschnitt for delivery of mails and other items; or, perhaps he makes his computations on the whole of the Southern Pacific lines, instead of the Ogden line alone.—EDITOR.

portion than the express companies; but finally admitted that his views were only impressions and largely theoretical.

Mr. Valentine testified at length as to the relations of Wells, Fargo & Co.'s express to the railroads. He stated that the express company paid the railroads from 35 per cent. to 55 per cent. of its gross receipts—the latter amount only in a few cases and then under compulsion.

The service rendered the Government by the railroads is much more expensive and elaborate than that furnished the express companies. In a general way he thought the service furnished the Government cost the railroads one-half more than that furnished the express companies, and the payments to the railroads by the Government, considering the accommodations, he believed to be from 25 per cent. to 50 per cent. less than those of the express companies. He does not think the Government is paying too much. Thinks the charge to the public of one cent a pound for second-class matter is too low. The express companies formerly paid the railroads on a tonnage basis; now the business is generally done on a percentage of the gross receipts. The express companies compete with the Government in the carriage of packages of merchandise of one lb. weight and up, and, on the principle that the Government should not do anything for its citizens which they can do as well for themselves, the Government should leave the fourth-class matter to the express companies.

The most interesting testimony brought out at the hearing was given by Mr. Kruttschnitt, and he filed a large mass of statistics with the committee. Comparing the revenues and expenses connected with the transportation of the mails and express, he stated that the total compensation received for the transportation of mail over his entire line was $1,165,953 per annum.

The receipts from the express company (including proportion of wages paid train baggagemen, acting also as express messengers, and aggregate proportion of wages and expenses of joint agents), are $990,493 yearly. The Government requires for its business 60 cars; the express company, 31. Chargeable against the mail service is liability for personal injuries to postal employees, amounting to from $5,000 to $6,000 a year, and cost of delivery of mail at 72 terminal and 347 intermediate offices, $66,929.

Further, in comparing cost of mail and express service should be charged against the mail service interest and depreciation and additional cost of cars, which cost about $6,000 each, against $2,900 paid for baggage cars; additional expense for lighting mail cars, more than twice the cost of lighting express cars; cost of extra appliances, such as mail catchers, cinder screens, etc., which the Government requires and changes at will; transportation of Government employees, about $90,000 in excess of cost of transportation of express employees.

The revenue ton mileage per annum, compared with dead weight tonnage, shows that the railroad carries nine tons of dead weight per mile per ton of paying express, and 19 tons dead weight per ton of mail. Statistics show that on freight traffic the dead weight carried is one ton per ton of paying freight; on passenger traffic 21 tons dead weight (including sleeping cars) per ton of passengers. The Government pays for hauling R. P. O. cars five to six cents a mile. The railroad would charge for hauling the same cars for other parties, 22½ cents a mile.

Comparing the cost of handling freight, passenger, express and mail, the following figures were given (mills):

	Fght.	Pass.	Exp.	Mail.
Earnings per ton mile	4.9	8.8	12.9	6.3
Expenses	2.8	6.5	6.5	6.5
Profit or Loss ....P.	2.1	P.2.3	P.6.4	L.0.2

Mr. Kruttschnitt emphasized the point that the reason why the railroads could not carry the mails as cheaply as freight was because of the large amount of dead space (space occupied by fixtures) and the necessity for hauling the mail at the convenience of the Government instead of at the convenience of the railroad. If a 60-ft. mail car could be loaded to the same capacity as a 60-ft. freight car (30,000 lbs.), the revenue receivable on a carload of mail transported from San Francisco to Ogden at regular freight tariff, plus carriage of two employees at regular fare, would be $984, as against $257 now received for hauling car and transporting mail same distance. The paying load in the case of the Government is only 8 per cent. of the whole weight, while the paying load of freight is practically 54 per cent. of the whole weight.

In replying to claims made by a magazine writer that the railroads could afford to carry mails as low as 8 miles per ton mile, Mr. Kruttschnitt submitted some calculations, showing that the railroads cannot afford to carry mails even as low as one cent per ton mile. To produce one cent per ton mile, the following calculation was made: Assuming cost of maintenance and operating postal cars would be borne by the road as now, and each load to be somewhat less than 3½ tons, which is a fair average, the net amount collected from the Government per car per annum under the present plan would be $30,194; total operating expenses and taxes, at 21 cents per car mile, $25,041, plus 5 per cent. interest and 6 per cent. depreciation on cost of car ($6,000), $660 = $25.701; leaving net earnings per car per annum, $4,493, to pay for carriage of 405,433 ton miles per annum. This is equivalent to about one cent per ton per mile, and leaves nothing for proportion of cost of betterments, etc., which are a proper charge against the receipts, to say nothing of interest on bonds or other fixed charges.

If same weight of mail was handled in compartment cars, net earnings would be increased $6,488, making $10,981, or 38 per cent. of receipts, leaving expenses 62 per cent., which is about the average on all business. If the Government owned the cars and paid the same rate as now for transportation of mail, and paid railroads for hauling car regular tariff rate (22½ cents per mile) the net revenue to the railroads would be $28,833 per car per annum, instead of $4,493. If the Government owned its cars and the railroad hauled them free and paid mileage, as in the case of private cars, receiving pay for transportation of mail at the present schedule, with a guaranteed minimum weight of 24,000 lbs. per car, the cost to the Government would be $83,458 per annum, against $30,194 as now; and the revenue to railroads would be nearly $60,000 net, instead of $4,493.

Mr. Kruttschnitt thought that it would be for the interest of the railroads to weigh mails annually at their own expense.

The testimony of Mr. Bowen had to do largely with an alleged case of "stuffing" the mails on his road during the last weighing.

The committee will next take testimony at Chicago.

Railroads and Floods in Austria.*

Notwithstanding that the catastrophes due to floods in Austria in 1896 and 1897 were very remarkable, and the experience gained thereby very valuable, yet up to this time no extended notice of them has appeared in any technical publication.

The line between St. Johann and Worgl, in the Tyrol, suffered severely, and the following is a brief account of some of the principal points of importance in the reconstruction. After several weeks of almost continual rainy weather, which reached its greatest intensity during the night of Aug. 11, 1896, the height of water in the streams in the valley exceeded by from 0.5 m. to 1 m. the greatest ever known. Such large quantities of driftwood (principally the trunks of fallen trees) were brought down by these streams (which accumulated in spots to a height of 3 m. to 4 m.) that many bridges and culverts were torn away, and the railroad embankment was washed out in many places, not so much from overflowing as from erosion by the powerful current against the sides.

In a short time large portions of the roadbed were undermined, notwithstanding the fact that only in a few places did it border on the streams, and about 2,000 m. had wholly disappeared.

The rapidity of the destruction was such (the greatest damage having been done within about three hours), and the injuries happened in such unexpected places, that the efforts were necessarily confined to saving and protecting the most valuable property. Any means at hand were employed to save it from destruction. Thus the ruin of the Soll-Lenkenthal station was prevented by laying series of tree trunks before it, and the undermining and washing out of the abutment of a bridge by means of a hastily constructed raft anchored by a rope.

During the next day, under the protection of this raft mattresses made of willows and alders were secured in place and formed the basis of the permanent reconstruction.

The restoration of the interrupted sections of the road, as well as the temporary bridges, trestles and other structures necessary for resumption of the traffic, was rendered much more difficult by the extreme high water on the one hand, and the uninterrupted rain on the other. The new construction must withstand the heavy water pressure, while the new course of the stream in many places encroached upon the roadbed. The highest praise and recognition are due to the several regiments of the Swiss guards, who fought destruction by the waters with the greatest energy and persistence.

As the road was entirely destroyed in no less than 12 places, while in 10 others it was seriously damaged, complete repair or rebuilding within a short time was not to be thought of. Attention was therefore given principally to temporary arrangements for carrying the traffic until more complete provision could be made. This was in general accomplished by laying the track close to the stream, but in some cases by wooden trestles built of round logs and carried to a height of 8 m., with a length in one case of 20 m. (having 10 openings of 2 m. each.) The construction and erection of these trestles required not quite 22 hours. By the energetic prosecution of the above work a part of the passenger traffic was resumed in 10 days and the whole road was opened in 14 days.

The great superiority of wooden trestles over earthwork for temporary repairs was demonstrated, as the latter would have required a relocation of the line. By the end of November, 1896, the reconstruction was so far advanced that the tracks were rebuilt in substantially the old locations, and the trains could resume their normal speed. These works required a total of about 60,000 cubic meters of material. For the protection of the banks, filling with boulders, even of the largest size, was not adopted because in one instance the undermining of a single stone was followed by the washing out of the whole embankment. On account of this accident fascines were resorted to, made into the form of mattresses five or six meters long and two or three meters broad, sunk at the side of the channel and weighted with stone. The banks of the streams were afterward protected in some places by stone paving, in others by cribs of round timber filled with stone, and in still other cases by bundles of fascines laid alternately lengthwise and crosswise of the bank.

In one or two cases undermining of the timber cribs and erosion of the bank behind them, which had begun to take place, were stopped by the accumulation of material brought down by the stream and lodged in the cavities which the water had begun to excavate.

*Translated and condensed from the Zeitschrift des Oesterreichichen Ingenieur und Architekten-Vereins, July 22, 1898.

TECHNICAL.

Manufacturing and Business.

One of the employees of F. C. Austin Mfg. Co., at Harvey, Ill., has invented an attachment for bending machines or bulldozers, made by that company, that is considered an improvement which may revolutionize the use of all this class of machines. It is an adjustable form or die, and by its use thirteen sets of separate forms, for bending different shapes, weigh only 166 lbs., while if applied to the machine in the old way their weight would be many thousand pounds.

T. W. Harvey, Jr., formerly Secretary of the Harvey Steel Car Co., at Harvey, Ill., has opened an office at 1256 Monadnock Building, Chicago, for the purpose of handling railroad supplies and equipment.

F. M. Cowling has been appointed Sales Agent of the National Railway Specialty Co., with headquarters in the Old Colony Building, Chicago.

H. H. Vaughan, Mechanical Engineer of the Philadelphia & Reading, and formerly Mechanical Engineer of the Great Northern, has accepted the position of Mechanical Engineer of the Q. & C. Co., with headquarters at the Chicago office in Western Union Building.

The Chihuahua & Pacific has ordered two 60-ft. turntables from Cofrode & Taylor. The New York office of the road is at 80 Broadway.

The shops of the Lima Locomotive & Machine Company, Lima, O., are now running 13 hours a day. The company has orders for five 50-ton Shay locomotives, two 17-ton Shay locomotives and one 20-ton Shay locomotive, and an order to rebuild 12 mogul locomotives for the Detroit & Lima Northern.

The Standard Coupler Company is enlarging its plant at Bridgeport, Conn. The company says that its standard steel platform is now in use on 50 railroads in the United States and Canada. Besides making steel platforms and car couplers, it has recently put on the market the Wayland insulated rail joint.

W. H. Pratt was appointed manager of the works of the Universal Construction Co. of Chicago, on Nov. 1. Mr. Pratt goes there from Mount Vernon, O., where he was receiver and manager of the Mount Vernon Bridge Co., previous to which time he was connected with the Edge Moor Bridge Works.

The American Steel & Wire Co. has absorbed the McMullen Woven Wire Fence Co. of Chicago.

It is stated that the Harrisburg Foundry & Machine Co. has prepared plans and will shortly ask bids for building a new plant in Harrisburg, Pa., to cost about $200,000.

Bids will be received at the Bureau of Yards and Docks, Washington, D. C., until Nov. 26, for boilers for the navy yard at Boston. Specifications and blank forms may be had by addressing the Commandant of the United States Navy Yard, at Boston.

Some new boilers will be installed at the Brooklyn Navy Yard, and bids will be received until Nov. 26 at the Bureau of Yards and Docks, Navy Department, Washington, D. C.

It is stated that G. H. Gallery, Eaton Rapids, Mich., is receiving bids for a power house, boilers and stand-pipe pumps for the Board of Water-Works and Electric Lighting.

Bids will be received at the office of the Commissioners of the Water and Lighting Department of Oil City, Pa., until Dec. 5, for one vertical cross compound crank and fly-wheel pumping engine of 3,300,000 gallons capacity. Specifications may be obtained from Park C. Porter, Clerk of Water Board, and may be seen at the City Engineer's office.

Harold P. Brown, 120 Liberty street, New York City, has received an order from the Government for 800 pairs of Edison-Brown plastic bonds, with the necessary amalgam for securing in place, for the naval proving ground at Indian Head, Md.

A new corporation, the Dyea Wharf & Warehouse Co., has been formed to buy, build and operate wharves, warehouses and toll bridges at Dyea, Alaska, and other places. The capital stock is $32,000. Five trustees are named: H. C. Wallace, H. C. Henry, Fred. Dodwell, Sol. G. Simpson and Charles Stewart. The place of business of the company is fixed at Tacoma, Wash.

Iron and Steel.

It is stated that an order is being negotiated in this country for 40,000 tons of rails for Sweden.

The preferred and common stock of the Federal Steel Co. is now ready for delivery in exchange for receipts for stock of the Minnesota Iron Co., Illinois Steel Co., and Elgin, Joliet & Eastern Railroad Co.

The Illinois Steel Co. will soon build at its South Chicago works a large new steel foundry, in which to make steel castings for its own use. The new slabbing mill and electric lighting plant now under construction will be completed about Jan. 1.

The Standard Steel Works are making an extension to their open-hearth plant at Burnham, Pa., by putting in a new 15-ton Wellman rolling furnace.

It is stated that the Braddock Wire Co. of Braddock, Pa., has purchased a tract of land, and will improve its plant to the extent of about $200,000.

Press dispatches state that plans have been filed with the Building Inspection Bureau of Philadelphia for a coal shed for the United Gas Improvement Co., to be 113 ft. x 125 ft., of wrought steel framework, covered with corrugated iron, contract for which has been awarded to Louis Havens for $40,000.

The two plants of the Lebanon Boiler, Foundry & Machine Co. of Lebanon, Pa., will be sold at public sale on Dec. 6.

Rumors, which there is reason to believe are true, state that John W. Gates has resigned as President of the Illinois Steel Co.

New Stations and Shops.

We are advised by an officer of the Ohio Southern Railroad that the company has not seriously considered building new shops at Springfield.

We are officially informed that the Union Pacific has done nothing in the matter of building a round house at Rawlins, Wyo.

The Detroit, Ypsilanti & Ann Arbor is building new repair shops at Ypsilanti, Mich. Spier & Rohns of Detroit are the architects. M. J. Griffin is the contractor.

The Norfolk & Western has awarded a contract for building a ten-stall round house at Columbus, at a cost of $15,400. The building will be of brick, with steel truss roof.

The Gulf, Colorado & Santa Fe has taken out a permit for building a new freight station at Denver, Col.

Passengers Carried on the Manhattan Elevated.

In the diagram giving the travel on the railroads in New York and Brooklyn, printed last week, page 812, the line showing the passengers carried on the Manhattan was not plotted from sufficiently complete reports to make it correct for every year. In 1893 it shows a marked variation from the figures given by Poor, and if corrected the line in the diagram would rise considerably for that year, which it might reasonably be supposed to do, since there was a falling off in the street railroad traffic from 1891 to '94. Below is given the number of passengers carried for each of the eight successive years ending Jan. 30, 1898. The number for the last year was given to us by Mr. W. J. Fransioli. This is made up of the following items for the different lines: Second Avenue, 26,391,853; Third Avenue, 54,037,623; Sixth, 71,577,414; Ninth, 19,067,468; total for Manhattan, 171,074,358: suburban, 12,286,488; total, 183,360,846.

	1890.	1891.	1892.	1893.
Passengers carried,	185 833,632	196 714 199	213 692,743	221 407 197
1894.	1895.	1896	1897.	1898.
202,751,532	187,614,985	184,703,636	182,964,851	183,360,846

The Harris Compound Direct Air Pressure Pump.

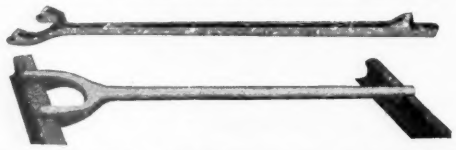
Prof. Elmo G. Harris, of the University of Missouri, has obtained patents on the machinery for a new method of pumping fluids and semi-fluids by means of compressed air. The name "direct air pressure pump" is applied to that class of pumps in which the liquid is taken into an air-tight vessel and driven out by compressed air, the pressure being directly applied on the surface of the liquid. This design makes it possible to provide a simple means whereby one pump can indirectly drive a number. An important part of the apparatus is a switch which can automatically be worked in either of three ways: First, by means of suction which occurs in the intake pipe to the compressor; second, by an electrically controlled apparatus the circuit can be made or broken by a pressure gage on the intake; third, by a float in one of the tanks. In each case the switch is made adjustable and can be set while the pump is working. This system can be applied anywhere, but its peculiar advantages appear when the water is distinct from the source of power, as in mines and wells, or where a power plant already installed obtains its water supply from some distant point or points. In this system one compressor can pump many places at the same time. Where the lift must be great and the compressor already installed is not designed for high pressure the lift can be divided into two stages, but it is preferable to lift the water in one stage with a compound compressor working against a head of 200 ft. or more. This compressor, made by the Pneumatic Engineering Co., of 100 Broadway, New York City, can be run on a properly proportioned system with 15 to 20 per cent. losses outside the compressors. This includes the friction in the air and water pipes and expansion in air pipes.

High Grade Cold Pressed Steel.

At the New York office of the American Steel Foundry Company, in the Havemeyer Building, there is on exhibition a few pitchers with a capacity of about three quarts each, which were pressed cold into the form in which they are shown. The ingot from which the steel casting had been made was rolled into a bar at the Granite City Steel Works, then into sheets at the Granite Iron Rolling Mills, and was pressed cold at the works of the St. Louis Stamping Co. from a casting made by the American Steel Foundry Co. About 100 of these pitchers were pressed cold without a breakage, which would lead one to believe that the art of casting steel has been brought very near a point of perfection. The metal used in pressing these articles is the same as is used for the bolsters and castings made by the American Steel Foundry Co.

A Pressed Steel Track Gage.

It has been found by track men that the heads of ordinary track gages sometimes get loose when bolted on, or when attached by screws or pins which are put through and riveted over. This difficulty has prompted the Sheffield Car Company, Three Rivers, Mich., to bring out a track gage having the head integral with the shank by stamping the whole out of a simple piece of sheet steel. The form used is that of the well known Huntington gage, and the construction is clearly shown by the illustration, be-



ing a top view and a view of the gage reversed, which shows the edges of the sheet metal. The ends are closed with a rounded or oval shape, thus adding to the finish and attractive appearance of the tool, while the edges which come in contact with the rail are reinforced by small iron blocks to prevent wear; these blocks are held by rivets. As many roads are now equipped with electric signals, the gage is usually made in two parts and separated by a wooden insulating block, so as to prevent short circuits through the gage. The tool is light and should prove quite durable.

The Ring Valve Patent Suit.

In the recent suit of the Hancock Inspirator Co. vs. A. Harvey's Sons Mfg. Co., Ltd., in the U. S. Circuit Court at Detroit, the validity of the Loftus patent, No. 300,092, dated June 10, 1884, and owned by the Hancock Inspirator Co., was established. The Court, in its opinion, says: "The combination (claimed in the Loftus patent) was new, and the results it produced were more reliable and efficient, and gave the injector an automatic capability not possessed by any previous apparatus." He "transformed Giffard's eccentric invention into a reliable and valuable accessory to the steam engine."

The Hancock Inspirator Co. has issued a circular stating that a suit is now pending on this patent in the U. S. Circuit Court for the District of Massachusetts against a dealer in "Penberthy" injectors, and all manufacturers, dealers or users of injectors provided with a "ring valve" to close the space between the suction tube and the combining tube are liable to suit and to the payment of damages and the profits of past infringement. The American Injector Co., of Detroit, Mich., manufacturing the "United States" injector, is licensed under the Loftus patent.

Pig Iron Production in October.

Figures published in the Iron Age show an increase in the production of pig iron during October. On Nov. 1 there were 196 furnaces in blast, with a weekly capacity of 228,935 gross tons, as against 192 furnaces in blast Oct. 1, with a weekly capacity of 215,635 gross tons; and against 183 furnaces in blast Nov. 1, 1897, with a weekly capacity of 213,159 gross tons. Stocks sold and unsold on Nov. 1 amounted to 586,487 tons, against 621,728 tons on Oct. 1.

Reduction in Cost of Electric Current.

The Edison Electric Illuminating Co. of New York City some time ago reduced the cost of electric power to the one cent basis, and now its rival, the United Electric Light & Power Co., has reduced the rate even lower, putting it on the three-fourths cent basis. This reduction means that hereafter current will be supplied for incandescent lighting for 15 cents per k. w. hour, as against 20 cents now charged by the Edison Company under their new schedule. On the one cent per hour basis an incandescent light is about equal in cost to gas at $2 a thousand. The schedule recently issued by the United Electric Light & Power Co., however, places the cost of a light if used in excess of three hours at ¼ cent an hour, which means that gas would have to be furnished at about 50 cents a thousand in order to compete with it. The wholesale rate under the new schedule is 10 cents per k. w. for the first three hours of daily use and five cents per k. w. for all in excess of that time. Reduction in the charges for arc lighting is about the same as for the incandescent.

The Kalamazoo River Power Plant.

The Kalamazoo Electric Company, Kalamazoo, Mich., is building a dam to develop the water power of the Kalamazoo River near Allegan. The head of water at the dam is 23 ft. Wheels will be put in at the present time aggregating 3,000 h. p. The power available, it is estimated, is about 3,500 h. p. Work on the dam and power house commenced about six weeks ago, and has been progressing rapidly ever since. The contract calls for their completion about Jan. 1. The company will supply power for lighting and manufacturing purposes in Kalamazoo, Allegan and intermediate villages. Plans for the development were made by O'Keefe & Orbison. Mr. H. A. Collar, of Grand Rapids, is the engineer in charge. Mr. James B. Foote, of Jackson, is the electrical engineer.

Portable Magnetic Lamp Holder.

A simple device is now being made by Jenkins Bros., of New York, for mechanics desiring a convenient method of lighting the work on a lathe or for similar purposes. The device consists simply of a socket somewhat similar in appearance to the socket for an electric lamp. This is provided at the end opposite the one which holds the lamp with two small bar magnets. These are sufficiently powerful to hold the lamp firmly in place when placed on a piece of iron. In this way the light can be directed to the work being done by the mechanics.

Calcium Carbide in Switzerland.

In a recent issue of Industries and Iron Mr. E. A. Schneider gives a description of the works for making carbide and calcium in Switzerland. The principal one is at Rhinefelden, where a German company is now using 1,000 h. p. for making the carbide. When completed the plant will generate from 4,000 to 5,000 h. p. At present two large works are being built, one of 4,000 and the other of 7,000 h. p. The selling price of carbide in Switzerland is 40 centimes per kilogram (about 3½ cents a pound), for quantities above a ton; quantities below that amount sell at from 40 to 50 centimes. The main export goes to Germany and to Italy. Bulgaria, Egypt, Tunis and Algeria are also large consumers. The writer remarks that the conditions for making the carbide in Switzerland are decidedly favorable, but small works, with less than 2,000 electric h. p., are not profitable. The total cost of a plant of about 3,000 electric h. p. should not be more than $120,000, not including the power station. It is estimated that a plant of this size should give a dividend of at least 10 to 12 per cent. on the invested capital.

THE SCRAP HEAP.

Notes.

The freight station of the New York, New Haven & Hartford at Park Square, Boston, will be abandoned on Nov. 27, and the freight business of the Providence Division of the road will be transferred to the Midland Division at Readville, and Boston freight will be received and delivered at the South Boston yard, which lies across the channel from the new passenger station.

The old passenger station of the Boston & Albany, at Beach street, Boston, which was abandoned 15 or 20 years ago, and which since then has been used as a freight house by the express companies, is to be torn down within a few months and the ground is to be occupied by a five-story building for offices and stores. This building is to be put up by a syndicate of men interested in the shoe trade.

The Pennsylvania has put on a night express train from Pittsburgh to New York, starting at 10 p. m. and running through in 9 hours 45 minutes. The train runs over the Trenton cut-off, by which the distance through is about 431 miles. Allowing 9½ hours for the run of the train to Jersey City, 430 miles, the rate of speed is 45¼ miles an hour. The time of the Pennsylvania Limited from Pittsburg to New York is 11½ hours.

A New Irrigation Canal in Idaho.

A company, composed principally of local men, was formed some while ago in Southern Idaho to build an irrigation canal that will utilize the waters of the Bear River, a large stream which empties into Salt Lake. The company, which is incorporated, is the Interstate Canal & Power Co. Surveys were made under the direction of Mr. John I. H. McAllister, of Salt Lake City. A masonry dam will be started this Fall a few miles south of Soda Springs, Idaho. The dam will cost about $16,000. A canal will be made from that point running in a northeasterly direction about 11 miles, where it empties into a natural swale and through this is carried to the Portneuf River,

emptying in that stream near Bancroft. The water flows down the Portneuf to a point about five miles above McCammon, where it is taken out. From this point a canal will be made along the eastern border of Marsh Valley to Red Rock. Here the canal is divided, one-third of the water will be taken on the east side of Cache Valley and two-thirds carried on the west side through Oxford, Clifton, Weston, Trenton, and coming over the divide into Fielding, covering 20,000 acres in Salt Lake Valley. It is estimated that the canal will irrigate in all about 5,000,000 acres. The officers of the Interstate Canal & Power Co. are George C. Parkinson, of Preston, President; Chester Call, of Chesterfield, Superintendent; Bishop E. G. Farmer, Treasurer, and James McMurris, Secretary.

Disastrous Collision in Canada.

At 3 o'clock on the morning of Nov. 15 a westbound passenger train of the Grand Trunk ran over a misplaced switch at Murray Hill crossing, two miles west of Trenton, Ont., and into the head of an eastbound freight train. Both engines and several cars were badly wrecked. The baggage car was pushed back almost completely through the second-class passenger car, and hardly a single passenger in this car escaped injury. Both enginemen, one fireman and nine passengers were killed, and three trainmen and 10 passengers were injured. From the accounts in the daily papers, it would appear that the misplaced switch was at a point where the passenger train should have passed from single to double track.

Proposed Lake Superior Ship Canal.

Articles of association of the Lake Michigan & Lake Superior Ship Canal & Dock Company have been filed with the Secretary of State at Lansing, Mich. The capital is $50,000. The company is composed of Chicago men, whose object is to dig a canal from Lake Michigan to Lake Superior through Delta and Alger counties.

Lake Notes.

The sea wall along the Lake Shore drive at Chicago, damaged by the storm of Oct. 25, was further damaged Nov. 9 and 10, large sections being washed away. The storms mentioned caused large losses all along the lake front at Chicago. On Nov. 10 the schooner Iron Cliff foundered while tugs were trying to get her into the harbor. The vessel was insured for $30,000.

The American Steel Barge Co., of West Superior, is to build, for the Bessemer Steamship Co., a lake steamer, to be 460 ft. long, 50 ft. wide and 30 ft. deep, to carry 8,000 net tons. The new boat will be the largest yet built on the lakes, being 10 ft. longer than the Roebling.

The Dismal Swamp Canal.

Press dispatches say that the improvements of the Dismal Swamp Canal have been completed, and have cost about half a million dollars.

Train Robbery in Minnesota.

On the evening of Nov. 10 a passenger train of the Great Northern was stopped by eight robbers five miles west of Fergus Falls, Minn., and one of the safes in the express car was blown open and robbed. The robbers spent two hours with drills and dynamite on the other (through) safe, but were unable to get at its contents. They then departed, after taking $20 from the engineman. The express car was badly damaged by the explosion. As soon as the train stopped the rear brakeman went back with his red light, and the robbers shot at him, inflicting a slight wound. It is said that one of the robbers proposed to leave the express car and go into the passenger cars, but that the others refused, because it was believed that some of the passengers had made preparations to resist an attack. Press dispatches state that six of the robbers were captured the next day.

Highway Crossing Bells.

The State Railroad Commissioners of New York, after considering an application from Dunkirk for the abolition of a grade crossing, have decided that they are not at present justified in ordering a change, but they recommend that the three railroad companies crossing the street at the point in question join in the erection of a warning bell.

The Council of the borough of Maywood, N. J., acting under the law passed last year, have required the Erie road to place an electrical warning bell at Maywood avenue in that village, and the Chancellor has confirmed the order.

Verdict on Canton Junction Train Accident.

Judge Marden, of the District Court, at Stoughton, Mass., has filed his finding on the inquest on the derailment at Canton Junction, Aug. 8. He says: "I find that the derailment was caused by the parting of a joint in a switch rod. I find that this joint must have been defective for a considerable time, but that the defect was of such a character as would not be externally apparent, or discovered by the methods of examination which were in use by the railroad company at the time, though it might have been discovered by a more careful examination."

A New Railroad in Madagascar.

The Colonial Co. of Madagascar, a precursor of the French Society of Railways, Madagascar, now being organized, received a concession Sept. 2 to build a line on the east coast from Tananarivo south to Tamatave. The concession carries a grant of 247,100 acres of land, with the eventual grant of as many acres more in case the company builds as far as Tamatave; also the eventual ownership of the proposed Pangalanes Canal from Andevorante to Tamatave. The company is given for 15 years a right to build and operate the railroads running from the sea between Fenerive and Mahanoro to points on the railroad, branch lines from the railroad in the Province of Imerina and independent lines connecting Tananarivo with any point of the Province of Imerina or with the sea. Telegraph lines are to be built along the route. Six hundred thousand francs ($115,800), must be deposited as guarantee of the proper accomplishment of the work, one-third of this amount to be returned when the work is half done, and another third when the line is opened. The track must be one meter (3 ft. 3.37 in.) wide; trains must run three times a week, and the speed required is at least 20 km. (12.4 miles) per hour for passengers and 15 km. (9.3 miles) for freight.

Electric Railroads in Gothenburg, Sweden.

Mr. Robert S. S. Bergh, United States Consul, sends a report concerning the condition of the plans for building an electric railroad system in Gothenburg. In March, 1897, the City Council appointed a committee to collect information in the matter. The committee has now made a report recommending that the city should build an electric-power station and four electric railroad lines, aggregating seven and a half miles, double track, overhead construction, the lines to be used by the present tramway company, on payment to the city of certain dues and a certain percentage of the profit; the company to provide the rolling stock. The Gothenburg Tramways Co., which now uses horse power, has been granted a concession up to 1917; hence the above proposition is intended to be a compromise between the city and the company.

Siemens & Halske, of Berlin, have furnished the committee an estimate, from which it appears that the total cost of construction (value of sites for the buildings not counted and value of the old tramways deducted) will amount to about $501,160, of which the city's share would be $342,504. This last sum includes the cost of the power plant ($96,480), with cost of wire and tracks. The city has reserved rights to arrange cheap trips for working people before 8 o'clock in the morning, and has stipulated that passengers who have paid regular fare on one line may continue on another by paying half fare in addition to the sum first paid. The work shall begin in May, 1899, and two of the lines shall be finished before November, 1899, and the rest ready for traffic by September, 1900.

Technical Schools.

Massachusetts Institute of Technology.—A descriptive circular has been issued by the Department of Mechanical Engineering, which gives a schedule of the course and other general information regarding the Department, a statement of the tests more frequently made, the title of the thesis for the class of 1898 and tables showing the present occupations of all the graduates of the departments since 1868. There are 389 living graduates of the Department of Mechanical Engineering, over 90 per cent. of whom are employed in work for which they received special training at the Institute. The circular gives a complete outline of the tests made during the past year, and some records from those of importance.

Lehigh University.—Changes have recently been made in the basement of Packer Hall so that two large rooms are now available for the testing laboratory of the Civil Engineering Department. New machines for torsion and compression tests have been added, making very good facilities for cement testing. During the present year researches will be made on methods of testing cement by flexure and by impact. Professor Merriman, the head of the Department of Civil Engineering, has recently published an article on "The Slate Regions of Pennsylvania," giving the results of a comprehensive series of tests on roofing slates. This article has been printed in pamphlet form by the University, and can be obtained from the Secretary. Following is a list of the non-resident University lectures for the first college term: Dr. C. B. Dudley, of Altoona, on "What a Chemist Does on a Railroad"; John C. Trautwine, Jr., of Philadelphia, on "The Water Works of Philadelphia"; G. S. Morison, of New York, on "Masonry"; F. L. Grammer, of Cornwall, Pa., on "Blast Furnace Management"; Hampton L. Carson, of Philadelphia, and R. W. Hunt, of Chicago, on "Iron Manufacture in Sweden."

Proposed Electrical Transmission Plant for Denver.

A recent issue of the Western Electrician states that plans have been prepared for an electrical transmission plant to supply the city of Denver with light, heat and power from water reservoirs built in the mountains. Rhodes Bros., of Denver, the promoters of the enterprise, recently took the City Council on a trip to the site of the proposed dam near South Platte, Col. The site of the proposed power house is about one-half mile inside Platte Cañon, the tunnel to be from two miles up the South Fork, where it is proposed to build the dam. The location is said to be desirable, inasmuch as the cañon narrows down to about 200 ft. at that point, back of which is an area sufficient for a lake. The plan is to collect water from both the north and south forks of the river, the intake dam on the North Fork to be 10 ft. higher than the storage reservoir on the South Fork, so that the first water used will be from the former, while any excess will be backed up for storage in the latter. The tunnel and pipe lines for both dams will be about two miles long, joining just east of South Platte. The plans call for about five miles of tunnel, which is preferred for permanent construction to pipe lines. The actual fall of water from the storage reservoir to the water wheels is given as about 750 ft., the last 500 ft. of which will be steel pipe down the mountain from the last tunnel opening, which will give great momentum to the water and enormous pressure. The fall through 10-ft. tunnels will be about 20 ft. per mile. About three-quarters of the tunnels will be concrete, to hold up loose rocks and to diminish friction. Where necessary to cross streams or gullies steel truss bridges and steel pipe 8 ft. in diameter are contemplated. The cost is estimated at $2,000,000, and if franchise is granted the first power may be used in Denver within two years.

The Bilgram Diagram.

The Journal of the Franklin Institute for November contains a short article by Mr. Merrill Van G. Smith, entitled "Bilgram's Diagram and the Solution of Problems Involving Lead." The problem is, given the point of cut-off, lead and port openings, to find the angular advance, lap and eccentricity. The solution is of interest, inasmuch as it has generally been claimed that this problem admitted of only an approximate solution by the Bilgram method, but Mr. Smith shows that the same can be solved by a simple and exact construction.

Railroad Material for India and the Colonies.

Bids are being asked for the supply of rails, fish plates, bolts and nuts and spikes, for the Burmah Railways Co., Ltd. Specifications and form of tender can be obtained at the office of the company, 76 Gresham House, Old Broad street, E. C., London.

The Secretary of State for India is inviting tenders for locomotives. The conditions of contract may be obtained on application to the Director General of Stores, India Office, Whitehall, S. W., London.

The Great Indian Peninsular Railway Co. is inviting tenders for the supply of various stores. Specifications and forms of tender may be obtained at the office of the company, Copthall House, 48 Copthall avenue, E. C., London.

The Madras Railway Co. is inviting tenders for the supply and delivery of brass and copper tubes, copper rods and rivets, iron and steel bars, saws, steel taps, pressure gages, grindstones, brushes, belting, crucibles, emery wheels and other stores. Specifications may be seen at the office of the company, 61 New Broad street, London, E. C.

Tenders are invited by the Agent General for Victoria, 15 Victoria street, London, for the supply of 32,180 tons of rails and 3,258 tons of fish plates in three contracts.

Change of Motive Power on a Tramway.

Mr. F. C. Scarr, Secretary and Manager of the Dublin & Lucan Steam Tramway Co., writes that the contract has been signed for changing the motive power of the road to electricity, the change to take place in about six months. The contractors are Messrs. Dick, Kerr & Co., of London, and the engineers for the electrical equipment are Messrs. Alfred Dickinson & Co., of Birmingham. Seven miles of track are now worked by steam. When the change is made, five motors and 12 trailers will be used. The President of the company is William Mooney; Vice-President, James W. Hill; Purchasing Agent, Francis C. Scarr.

The Soo Canals.

The following is a report of the chief items of freight and passenger traffic to and from Lake Superior for the month of October, 1898, including statistics of the United States and Canadian canals at Sault Ste. Marie, Michigan and Ontario:

East Bound.

		U. S. Canal.	Canadian. Canal.	Total.
Grain	Bushels.	4,503,828	82,107	4,585,935
Flour	Barrels.	1,496,909	75,850	1,572,159
Iron Ore	Net tons.	1,253,898	146,063	1,399,961
Wheat	Bushels.	13,200,579	1,890,166	15,090,745

West Bound.

		U. S. Canal.	Canadian Canal.	Total.
Coal (hard)	Net tons.	80,166	5,200	85,366
Coal (soft)	Net tons.	261,809	38,115	299,924
East bound freight, net tons				2,405,217
West bound freight, net tons				471,976
Total				2,877,193

Total craft—United States	1,974		
Total craft—Canadian	315	2,289	
Total registered tonnage—United States.	2,385,762		
Total registered tonnage—Canadian	262,728	2,648,490	

Protection Against "Pauper Labor."

Along the frontier between France and Germany, there is a floating population of Belgian, German and Italian workmen, who are always ready to take the place of French employees when an opportunity occurs. The Compagnie du Nord has been in the habit of selling to these workmen in the frontier towns tickets to be used in passage from their homes to their work at a reduced rate. This has given rise to much complaint among the French laborers, who claim that this discriminates against them by facilitating the importation of foreign workmen. Two measures have been proposed as a remedy for this injustice: (1), to prevent these laborers from coming into the country, and (2), these reduced tickets not to be sold except to workmen who can show a certificate that the applicant lives in France. This last measure was proposed by the General Counsel and is approved by the Minister of Public Works. The first of these propositions is favored by the committee; and it has been pointed out that the second proposition might lead to diplomatic negotiations or measures of retaliation by the Belgian Government. What a pity Governor Tanner can't be hired to manage these matters for France!

French Subsidies.

The subsidies included in the budget for the ensuing year by the French Minister of Commerce make a total of 26,522,985 francs, of which 11,258,000 was for the trans-Atlantic service to New York and the West Indies, 3,107,936 for the lines to Australia and New Caledonia, 6,830,688 for the service to China and Japan, and smaller sums for various other lines, including 500,000 francs for the lines running to the west coast of Africa and 200,000 for the Calais-Dover line.

Railroad Taxes in Connecticut.

The taxes assessed against the railroads of Connecticut by the State Board of Equalization for the present year amount to $910,137, an increase of $35,701 over 1897. The tax is 1 per cent. on the stock and indebtedness, as valued by the State Board, and the increase has been steady for the past five years, the total amount of taxes in 1894 having been $729,036. The taxes assessed against the street railroad companies this year amount to $133,052. This sum represents a rapid increase, due to the construction of many new lines during the past seven years. In 1889 the street railroad taxes were $15,329; in 1893, $26,829; in 1895, $72,925; in 1897, $120,765.

The Boston Dry Dock.

The dry dock which the Government is about to build at the Boston Navy Yard will be a type of the granite docks to be built at other navy yards.

The dock will be of the following dimensions: Length, 750 ft.; width on the floor, 80 ft.; width at top, 114 ft.; width at entrance, 95 ft.; depth to floor, 40 ft.; draught of water on the sill, 30 ft. It will be of granite, or concrete faced with granite. If built entirely of granite, there will be used about 576,000 cu. ft. of cut stone and about 1,390,500 cu. ft. of rubble masonry. If the dock is built of concrete, faced with granite, there will be about 256,000 cu. ft. of cut granite and about 1,710,000 cu. ft. of concrete. The pumping plant will consist of three centrifugal pumps about 45 in. in diameter, driven electrically. The pumps will be submerged to the level of the dock floor, and driven by the engines and motors from the power room above, through the intervention of vertical shafts. No boiler plant will be installed within the dock, as the power will be generated at the central electrical plant of the yard. The contract for the dock will be let in one sum for the entire work, complete and in working order. The work will be publically advertised in a few weeks.

338 Cars in Two Trains.

The running of a very long and heavy freight train over the Pennsylvania Railroad from Altoona to Columbia, Pa., last August, and the more recent running of very long trains over the New York Central, has led to considerable investigation of long-train records, and the Bulletin of the American Iron & Steel Association (Philadelphia), Nov. 1, reports a case on the Pennsylvania in 1878, and one on the

Yazoo & Mississippi Valley, which appear to have been forgotten. Adding a few details which we have procured from officers of the roads in question, these old records appear to be as follows:

The Pennsylvania train of 1878 was hauled by Class I engine No. 41, from Clark's Ferry to Sunbury, 39 miles, and the maximum ascending grade was 10½ ft. per mile; the train consisted of 185 empty cars, one loaded car, two cabooses and one dead engine. The failure of this engine was the cause of the coupling together of the two trains which made the one long one. The length of the train was estimated to be 6,768 ft.

The other train was moved from Wilson, La., to New Orleans, 122 miles. We have not been able to ascertain the date of this event, but it was some years before the road, the Louisville, New Orleans & Texas, was acquired by the Yazoo & Mississippi Valley. The train consisted of 152 loaded cars, and it was moved by one engine the distance stated. The "Bulletin" says that the cars were loaded, nearly all of them with cotton; that the train was 5,370 ft. long, and that its gross weight was 2,721 tons.

River Improvements in Tennessee.

The annual report of the Chief of Engineers recommends appropriations for improvements in the Tennessee and Cumberland rivers to the amount of $1,730,000. In the past four years only $50,000 has been appropriated for improvements of the Tennessee River, but of course there was a considerable balance of unexpended appropriations. Major Kingman, the officer in charge, says that there is now nearly $500,000 available for work on the Cumberland River, and that work is going on fast on the locks and dams for slack water navigation. When these are completed there will be about 120 miles of such navigation in the stream. The river is divided into a series of pools, with a depth of not less than 6 ft. at extreme low water.

Long Locomotive Runs on the Southern Pacific.

"Sunset," the monthly publication issued by the passenger department of the Southern Pacific, and which, by the way, contains many bits of good reading, shows in its October issue a picture of one of the heavy eight-wheel passenger engines now used in hauling the Sunset Limited semi-weekly express between Oakland, Cal., and Algiers, La., 2,484 miles. These engines weigh 64 tons each, with 42½ tons on the drivers. The cylinders are 20 in. x 24 in. and the driving wheels, which have steel centers, are 6 ft. 1 in. in diameter. The boiler pressure is 200 lbs. per sq. in. Engines are changed on this train only nine times, the runs being as follows: Oakland to Bakersfield, 314 miles; Bakersville to Los Angeles, 168 miles (with a helper up the Tehachapi Mountain); Los Angeles to Yuma, 250 miles (including a run of 119 miles without a stop); Yuma to Tucson, 251 miles; Tucson to El Paso, 312 miles; El Paso to Sanderson, 316 miles; Sanderson to San Antonio, 308 miles; San Antonio to Houston, 209 miles; Houston to Algiers, 362 miles. Enginemen and firemen are changed oftener than the engines. It appears from the description, which is signed by Mr. Small, Superintendent of Motive Power, that on some divisions the water used in the boilers is so bad that some of it has to be blown out in the middle of the run to prevent foaming.

The same issue of Sunset contains an account of the dining cars on the limited trains, which states that all canned foods are tabooed, the ice boxes in the dining cars having been made large enough to carry all needed supplies of fresh vegetables, fruits and meats.

English and American Machines in Germany.

Mr. J. C. Monaghan, United States Consul at Chemnitz under date of Oct. 18, writes as follows, regarding the import of machinery into Germany. "In 1897 machinery to the value of $8,807,737 was received from England. Of this $1,054,858 were for steam engines, $4,444,428 for textile machines, $1,513,462 for agricultural machines, and $842,965 for sewing machines. Up to last year, the imports constantly increased. The eight months ending August, 1898, show a falling off. This is due to Germany's increased capacity to furnish her own needs, and to the rapidly gaining American competition. The United States is sending large quantities of machinery to Europe, particularly to this empire. If its capacity to compete with England and Germany continues to increase, it must soon hold the upper hand in these markets. In the eight months ended Aug. 31, 1898, England sent 28,287 tons, against 29,719 tons in 1897; the United States sent 16,190 tons in 1898 and 9,240 tons in 1897. Thus United States exports to this empire, which were only 30 per cent. as large as England's in 1897, were 60 per cent. in 1898."

LOCOMOTIVE BUILDING.

The Southern Pacific will buy a number of new locomotives.

The Maine Central is considering buying some more engines.

The Boston & Albany has increased its order with the Schenectady Locomotive Works to 10 engines.

The Flint & Pere Marquette has placed an order for five engines with the Brooks Locomotive Works.

The St. Louis, Peoria & Northern is preparing specifications with the intention of ordering, within the next three months, 30 locomotives.

It is reported that the Chicago, Burlington & Quincy is considering buying some new freight engines, but we have no definite information.

In our issue of Oct. 21 we stated that the Buffalo, Rochester & Pittsburgh had placed an order with the Brooks Locomotive Works for 10 engines. This order has been followed by other orders, which, we understand, average two engines a week, but we have been unable to obtain the total number to be built at this time.

It is expected that the Portland & Rochester will place orders for some new equipment. The road has placed an order with the Manchester Locomotive Works for building one 10 wheel passenger engine, according to Boston & Maine specifications.

The Canadian Pacific has placed orders for 25 compound consolidation freight locomotives, 12 with the Richmond Locomotive & Machine Works, seven with the Baldwin Locomotive Works and six with the Canadian Locomotive & Engine Co., of Kingston, Ont. They will have 21 and 33 in. x 26 in. cylinders; wheel centers, steel, 57 in. diam.; boilers, extended wagon top, 60 in. diam.; Belpaire fireboxes. The weight in working order will be 75 tons; the tank capacity will be 4,500 gals., the tender frames will be 9 in. sectional steel.

In our issue of Nov. 4 we stated that the Intercolonial, of Canada, would have three locomotives of the recent order built in Canada. Two of these will be simple and one compound. The simple engines will have cylinders 19 in. x 24 in., driving wheels 72 in. in diam., boilers 60 in. in diam. at smokestack and 67 in. in diam. at back end, with 236 tubes; fireboxes 67 in. long and 34½ in. wide. The boilers are designed to carry a working pressure of 180 lbs. The capacity of the tank will be 3,000 gals. of water and nine tons of coal. The tender truck wheels will be 36 in. in diam. and the engine truck wheels 33 in. in diam. The total weight of engines will be 140,000 lbs. in working order, and the weight of tenders 88,000 lbs., a total weight for each engine and tender of 228,000 lbs. They will be equipped with Westinghouse brakes, Janney couplers and Detroit sight feed lubricators. The cylinders of the compound engine will be 14 and 24 in. x 24 in.

CAR BUILDING.

The Boston & Albany has asked bids on 300 box cars of 80,000 lbs. capacity.

Armour & Co. will shortly order 200 cars for carrying beef, and 1,000 fruit cars.

The Southern Pacific is considering buying some 40 or 50-ton box cars, in addition to the 1,000 cars mentioned last week.

The order of the Continental Fruit Express with the Wells & French Co. has been increased to 500, as predicted in our issue of Sept. 23.

The Wisconsin Central order for cars was about to be let as we were going to press, and will call for 1,000 box, 250 flat and 100 furniture cars.

We are informed that the St. Louis, Peoria & Northern has asked bids on the cars referred to last week, but that the order has not yet been placed.

President A. E. Stillwell, of the Kansas City, Pittsburgh & Gulf, in his first annual report, says that 1,500 more box cars are needed, and that $2,500,000 equipment bonds should be issued at once.

The Cleveland, Lorain & Wheeling has ordered 125 coal cars of 60,000 lbs. capacity from the Barney & Smith Car Co., but is not in the market for 80,000 lbs. cars, as reported by a contemporary recently.

The Pennsylvania is building at its Fort Wayne shops 108 self-clearing gondola cars of 100,000 lbs. capacity. Material has also been ordered for 150 standard box cars of 80,000 lbs. capacity and 70 ordinary gondola cars of 80,000 lbs. capacity.

BRIDGE BUILDING.

ATCHISON, KAN.—It is stated that an order for a new bridge over the Missouri River at Atchison has been given to the Missouri Valley Bridge & Iron Works, Leavenworth. The price is $400,000 in bonds, guaranteed by the railroads entering Atchison. The contract is to be void if the Chicago & Eastern Bridge Co., which owns the present structure, accepts the terms of the railroads by Dec. 1.

BUCYRUS, O.—Press reports state that the Toledo & Ohio Central will build a bridge at Broken Sword, near Bucyrus.

BUFFALO, N. Y.—W. H. Cuddeback, Corporation Counsel, has published notice that the city of Buffalo will condemn certain lands for the purpose of widening Buffalo Creek, and building a bridge over it at Seneca St.

CHIHUAHUA, MEX.—The Chihuahua & Pacific, offices at 80 Broadway, New York, has ordered from the Pencoyd Iron Works 36 single spans and one double span bridge and four viaducts, in all 1,200 tons of steel.

ELK RAPIDS, MICH.—Press reports state the Commissioners of Antrim and Kalkaska counties have decided to build a bridge across the Torch at Elk Rapids. Ira A. Adams, Clerk, Antrim County. Bellaire; James M. Flag, Clerk, Kalkaska County, Kalkaska.

GREEN BAY, WIS.—The Green Bay & Western will build a steel span across Duck Creek to replace a wooden bridge. The roadbed has been raised four feet at the approaches to the bridge, in order to bring the track level with the draw. The center pier and abutments are now nearly completed, and the superstructure will be put up during the winter.

HORNELSVILLE, N. Y.—The City Engineer, F. W. Dalrymple, has been instructed to advertise for bids for moving the bridge at Canisteo St. to Van Scoter St., and for building a new bridge, with 24-ft. roadway, on Canisteo St.

KEARNY, N. J.—The Kearny Township Committee has declared the bridge over the tracks of the Erie RR., at Kearny Ave. to be unsafe. It is on the main thoroughfare, between Kearny and Harrison, and is maintained by the railroad company.

LEXINGTON, MO.—It is stated that the town will build a bridge over the Missouri River, to be about 420 ft. long, and to cost $50,000.

LORAIN, O.—The Commissioners of Lorain County will receive bids until Dec. 22 for building the Black River Bridge, at Lorain. The Osborn Co., Cleveland, are the engineers. Geo. H. Lewis, Auditor and Secretary of the Board of County Commissioners, Elyria, O.

LOS ANGELES, CAL.—Bids are asked until Nov. 21, for furnishing material and building bridges on Ninth St., Sixth St., Ave. 26 and St. Felix road; total estimated cost, $23,000.

MILWAUKEE, WIS.—It is stated that the Park Board will build a viaduct 800 ft. long and 100 ft. wide, on the Highland Boulevard, over the tracks of the Chicago, Milwaukee & St. Paul.

MISSOULA, MONT.—It is stated that T. L. Greenough and P. F. Grant are interested in a project to build a bridge over the Missoula River.

OTTAWA, ONT.—A steel bridge will be built over the Rideau Canal, from Mutchmor St. to Ottawa East, by the Dominion Government.

ROSSLAND, B. C.—The City Council of Rossland has voted to build a bridge on Washington St., over the Columbia & Western tracks.

ST. PAUL, MINN.—L. W. Rundlett, City Engineer, is preparing plans for enlarging the Wabash St. wagon bridge.

SHERMAN, TEX.—It is stated that the Commissioners of Grayson County are open to receive bids for building a steel bridge over Post Oak Creek. L. M. Tuck, County Clerk.

WILMINGTON, DEL.—The Baltimore & Ohio, it is reported, will build a bridge over the crossing at Fourth and Hawley Sts.

ZANESVILE, O.—Bids are asked for until Dec. 1 for the steel superstructure, and until Dec. 8 for the stone work on west end approach of the Monroe St. bridge. James L. Starkey, Auditor, Muskingum County.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chicago, Burlington & Quincy.—Quarterly, 1 per cent., payable Dec. 15.

Delaware & Bound Brook.—Guaranteed, quarterly 2 per cent., payable Nov. 19.

North Pennsylvania.—Quarterly, 2 per cent., payable Nov. 25.

Wilmington & Weldon.—Four per cent., payable Nov. 10.

Union St. (New Bedford, Mass.)—Two per cent., payable Nov. 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month, at 8 p. m.

Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.

Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7:30 p. m.

Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, Secretary.

Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.

Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month, except during July and August.

Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Tuesday of each month, excepting July and August, at 7:30 p. m.

Engineers' Club of Columbus. (O.)—Meets at 12½ North High street on the first and third Saturdays from September to June.

Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.

Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7:30 p. m.

Locomotive Foremen's Club.—Meets every second Tuesday in the club room of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.

Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7:30 p. m.

New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.

New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.

Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.

Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.

Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is Secretary.

Western Railway Club.—Meets in Chicago on the third Tuesday of each month at 2 p. m.

Western Society of Engineers.—Meets in its rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

The Civil Engineers' Club of Cleveland.

The regular monthly meeting was held Nov. 8, with Past President Ambrose Swasey in the chair; present, 26 members and 13 visitors. Mr. Oscar Textor, member of the Cleveland Chemical Society, presented a paper entitled "A Review of Tests on Steel Rivets," which was illustrated by lantern views and a variety of specimen rivets which had been subjected to severe tests. The material experimented upon was basic open hearth steel, the average chemical analysis of which, stated in percentages, is as follows: Phosphorus, .015; managanese, .46; sulphur, .033; silicon, .005, and carbon, .11. The rivets were tested for tensile and shearing strength, also by nicking and bending cold, and for their behavior under the hammer, both hot and cold. Tests were also made to discover crystallization under the rivet head, if any; the results were described as being very satisfactory, and the conclusion was reached that with proper manipulation and attention to temperatures such steel rivets are fully equal to the best wrought iron rivets and possess a superior tensile strength. A discussion followed by a number of the members and visitors.

Western Railway Club.

The regular monthly meeting of the Western Railway Club was called to order at 2 p. m., Tuesday, Nov. 15, 1898, in the Auditorium Hotel, Chicago. The paper read and presented for discussion was "The Framing of Cars."

The subjects for topical discussion were, "On the Road with Which You Are Connected, by What Improved Methods Are the Ashes Handled Which Are Removed from Locomotive Ash Pans?" "What Improved Means Are Used for Drying Sand and for Delivering it to the Sand Box on the Locomotive?"

Association of Engineering Societies.

In September last the Louisiana Engineering Society, with headquarters at New Orleans, was added to the twelve societies forming the Association of Engineering Societies.

In the Journal of the Association for September, 1898, Mr. C. H. Chamberlin, member of the Louisiana Society, contributes a paper describing and illustrating Deep Bridge Foundations on the Atchafalaya River, where two of the piers were sunk by the pneumatic process. The author remarks: "It is fortunate this method was adopted from the beginning of the work, because the obstructions encountered in sinking would have been more formidable by any other method." Mr. A. E. Brooke Ridley, member of the Technical Society of the Pacific Coast, describes and illustrates the Fraser Electric Elevator system. Mr. Lehman B. Holt, member of the Civil Engineers' Club of Cleveland, in a paper entitled "Test Meters for Boiler Plants," sets forth the advantages of the Worthington meter for this purpose. The author says: "The Worthington meter has not changed in any of its principal features since it was first constructed. . . . The best evidence that the rotary meters are inaccurate is that they cannot be used in making boiler plant tests. . . . It is only the question of a few years when there will be no steam plant economy without some type of machine for registering the amount of water passing into the boiler to determine the evaporation."

Franklin Institute.

The programme for November and December rather indicates that the Institute is making an effort to awaken new interest along many lines. On Tuesday of this week, Prof. Harvey W. Wiley spoke on "The Agricultural Possibilities of Our New Possessions." On Wednesday evening the following papers were read: "The Burton Electric Process of Unhairing and Tanning Skins," by Mr. George D. Burton; "The Kitson Incandescent Oil Lamp," by Mr. Arthur Kitson; "The Process for Fireproofing Wood to Be Used on the Woodwork of War Vessels," by Dr. Charles J. Hexamer; "The Inflammable and Explosive Properties of Smoke When Confined in a Burning Building, and Its Influence in Causing the Spread of Fire," by Mr. William McDevitt. The stated meeting of the Electrical Section will be held Tuesday, Nov. 22, the subject for the evening discussion being "Lightning and Lightning Arresters." Wednesday, Nov. 23, a special meeting of the Mining and Metallurgical Section will be held for the discussion of "The Microstructure of Bronzes" and "Specifications for Structural Steel in Rails." Meetings are also announced for Dec. 7, 13 and 14. An effort is being made to form a Mechanical and Engineering Section, which will be devoted to the consideration of subjects bearing strictly on mechanic arts and engineering problems. A circular recently sent out and signed by about 40 members of the Institute outlines some of the plans of this department.

Engineers' Society of Western Pennsylvania.

The regular monthly meeting of the Society was held in the lecture room of the Society's house, 410 Penn avenue, Pittsburg, on Tuesday, Nov. 15, at 8 p. m. The paper was on "Cast-Iron," by Dr. R. G. G. Moldenke. This is one of the papers to be read on the manufacture of iron and steel. Reginald A. Fessenden, Secretary.

A regular meeting of the Chemical Section was held in the lecture room of the Society's house on Thursday, Nov. 17, at 8 p. m. Mr. W. E. Garrigues addressed the Section on "Analysis of Alloys."

Association of Maintenance of Way Engineers.

A number of officers in charge of the maintenance of way of railroads have held a preliminary meeting looking to the organization of a permanent association, and Mr. A. Torrey, Chief Engineer of the Michigan Central, is temporary president or chairman. Another meeting is to be held next March.

Boston Society of Civil Engineers.

On the evening of Nov. 11 the Boston Society of Civil Engineers had a dinner and reception in celebration of its semi-centennial anniversary. The principal address was by Mr. Desmond Fitzgerald, past President of the Society, and nominee for the presidency of the American Society of Civil Engineers, who reviewed the history of the Boston Society from its beginning.

Engineers' Club of Philadelphia.

The regular meeting of the Club will be held on Saturday evening of this week at 8 o'clock. A paper will be read by Prof. H. W. Spangler on "Engine and Boiler Testing," after which a lunch will be served. At the invitation of Mr. George S. Webster, Chief of the Philadelphia Bureau of Surveys, about 50 members of the Club recently inspected the work now in progress on the Pennsylvania avenue subway and tunnel, the details of the work being explained by Mr. Webster.

Western Society of Engineers.

By invitation of the Faculty of the University of Illinois, a party consisting of about 150 members of the Western Society of Engineers and ladies left Chicago Friday morning, Nov. 11, for an inspection trip to that University. A special train was furnished by the Illinois Central. At Champaign street cars were waiting to take the party to the University. Luncheon was served in the main engineering building, and the afternoon was spent in visiting those parts of the University of most interest to engineers, accompanied by President Draper, Profs. N. C. Ricker, Ira O. Baker, L. P. Breckenridge, A. N. Talbot, A. W. Palmer, A. P. Carmen, W. H. Van Der Voort and others of the Faculty.

Five large buildings are used by the engineering department, four of which are new, having been completed within the past three years. Engineering Hall is a four-story brick building, having a frontage of 200 ft. and a large rear wing, and is used by the mechanical, electrical, civil and sanitary engineering departments and the department of architecture, for drawing rooms and lecture and class rooms. This building was completed in 1895. Another building contains the wood working shops and apparatus for experimental work in hydraulics and the strength of materials. A one-story brick building finished in 1896, is used for a foundry, forge shop and machine shop, while two other large buildings, completed in the latter part of 1897, are used respectively for a mechanical and electrical laboratory, and a central power and heating plant. The library building, completed in 1897, was also visited. The University now occupies in all 15 buildings, employs 214 instructors, has an attendance in the engineering department alone of nearly 400 students, and a total attendance, including the schools of medicine and law, of about 1,700. The total annual income of the University is $355,000, and the estimated value of the property is $1,800,000, the buildings and equipment of the engineering department representing alone an investment of more than half a million dollars.

After the inspection an informal meeting was held in one of the lecture rooms, and short addresses were made by President Draper and Profs. Ricker and Baker of the University, and by Messrs. L. P. Morehouse, R. W. Hunt, D. C. Morgan, W. J. Karner, Isham Randolph and W. H. Parkhurst of the Western Society.

A regular meeting of the Society was held Wednesday evening, Nov. 16. The various papers which were presented at previous meetings describing the track elevation work in Chicago were discussed, and an illustrated paper by Mr. Elmer L. Corthell was read, entitled, "The Manchester Ship Canal."

PERSONAL

—Mr. Alfred Lazarus, Secretary of the Third Avenue Railway Co., died of heart disease at his home in New York, Nov. 15.

—Mr. James F. Lawless, Superintendent of the Great Northern Express Co., has resigned. His successor has not yet been selected.

—Capt. George W. Horton, Vice-President and General Manager of the Citizens Line of steamboats, died at his home in Brunswick, N. Y., Nov. 12.

—Mr. W. S. Morris, Superintendent of Motive Power of the Chesapeake & Ohio Railway, was married at Fort Wayne, Ind., on Wednesday, Nov. 9, to Miss White, of that place.

—Mr. Joseph Cornell, President of the Citizens Line of steamboats plying the Hudson, died in New York Nov. 12. He was born at Rosendale, N. Y., 63 years ago.

—Mr. Collingwood Schrieber, Deputy Minister of Canadian Railroads and Canals, and executive head of the Intercolonial Railway of Canada, was married to Miss Gwynne, daughter of Judge Gwynne of the Supreme Court, at Ottawa, Ont., Nov. 14.

—Mr. Darius Miller, Vice-President and Traffic Manager of the Missouri, Kansas & Texas, was presented by his fellow officials at St. Louis, with a silver tea set, the occasion being the eve of his departure to St. Paul, Minn., to take the position of General Traffic Manager of the Great Northern.

—Mr. Horace B. Miller, one of the founders of the American Machinist, died on Oct. 25 at Napa, Cal., of heart failure. He was born in Philadelphia in 1839, served under Farragut in the Civil War, began his journalistic career at Pittsburgh, and in 1877 started with Mr. Jackson Bailey the Machinist. He was a member of the Press Club and of the American Society of Mechanical Engineers.

—Mr. Geo. W. Cross, who was recently appointed Assistant Commercial Agent of the Chicago, Milwaukee & St. Paul at Chicago, is well known among the older men in railroad circles, particularly on the Pennsylvania. He has not been connected with active railroad service, however, for the past 14 years. In October, 1881, he held the position of Superintendent of Transportation and Assistant to the General Manager of the Northern Pacific. Previously to his connection with that road, Mr. Cross served with the Indianapolis & St. Louis, the Pennsylvania and some of the fast freight lines, taking charge of traffic departments in various capacities.

—Mr. DeWitt Clinton Cregier, formerly Mayor of Chicago, died at his home on East Chicago avenue, Chicago, on the evening of Nov. 9. Mr. Cregier was born in New York City June 1, 1829, and was educated there. On Aug. 2, 1853, Mr. Cregier and Miss Mary S. Foggin of New York, were married and went at once to Chicago, where they have lived for over 45 years. Mr. Cregier leaves his widow and seven of their 10 children, one daughter and six sons. Mr. Cregier studied mechanical engineering, his first engineering work in Chicago being to superintend the building of the first pumping machinery for the water works. For 25 years he was Chief Engineer of the Water Department, designing nearly all the important machinery used for the water supply of the city. During the Chicago fire the older residents of the city remember his remaining at his post at the water works for many hours, keeping the pumps in action, only leaving after his hat, coat and shoes were burned through and his face and hands blistered. In 1882 Mr. Cregier was appointed City Engineer by Mayor Carter H. Harrison, serving for two years and then for two years as Commissioner of Public Works. Many of the bridges of the city were built under his supervision, and extensive street improvements were undertaken. In 1887 he resigned from the service of the city to become manager of the West Chicago Street Railroad, which position he held until the road was bought by its present owner.

Mr. Cregier was a prominent Democrat, and in the spring of 1889 was nominated for Mayor by that party and was elected. During his administration as Mayor, Mr. Cregier's most important work was in securing for Chicago the World's Fair. With the Hon. T. B. Bryan, he headed the delegation of citizens sent to Washington to ask of Congress the selection of Chicago for the World's Fair city. Later he represented the city on the Board of Directors of the Exposition and was identified with all the preliminary work. After his term as Mayor, Mr. Cregier resumed engineering, which he continued until 1894, when he was appointed by President Cleveland as Superintendent of the United States Indian Warehouse at Chicago.

Mr. Cregier was one of the early members of the Western Society of Engineers, which he joined June 14, 1869, and he served as President of that Society from Jan. 9, 1883, to Jan. 6, 1885. He was also a member of the Society for the Encouragement of Arts, Manufacturers and Commerce; a member of the Supreme Council, thirty-third degree, for the Northern Masonic jurisdiction of the United States, and of many other lodges and commanderies, in which he held high official positions.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—E. M. Utterback has been appointed Train Dispatcher at Newton, Kan.

Atlantic Coast Line.—W. H. Newell has been appointed Assistant Superintendent of Transportation of the Norfolk & Carolina Division, with headquarters at Norfolk, Va. The office of Trainmaster on that division has been abolished.

Canada Atlantic.—John E. Conner has been appointed New England Traveling Passenger Agent, with an office at 196 Washington street, Boston.

Chicago, Burlington & Quincy.—J. H. Lindsay, Roadmaster of the Galesburg Division, with an office at Galesburg, Ill., has resigned. He is succeeded by John King, heretofore Roadmaster of the Louisiana branch. His office is at the same point.

Chicago, Rock Island & Pacific.—Eben E. MacLeod, heretofore Assistant General Passenger and Ticket Agent at Topeka, Kan., has been appointed First Assistant General Passenger and Ticket Agent, with headquarters at Chicago. He succeeds S. F. Boyd, transferred to other duties. Geo. W. Duback, Assistant General Passenger and Ticket Agent at Chicago, has been transferred to other duties, and his place filled by L. M. Allen, heretofore General Agent at Davenport, Ia. E. W. Thompson, heretofore General Excursion Agent, has been appointed General Passenger and Ticket Agent of the lines west of the Missouri River, with headquarters at Topeka, Kan. He succeeds Mr. MacLeod.

Chicago, St. Paul, Minneapolis & Omaha.—W. C. Winters, heretofore Chief Clerk to General Superintendent Stuart, has been appointed Assistant Superintendent of the St. Paul-Sioux City Division, a newly created office.

Davenport, Rock Island & Western.—At the annual meeting of the stockholders, held in Chicago Nov. 5, the following directors were elected: J. W. Gates, John Lambert, John E. Drake, W. T. Palmer, H. B. Schuler, Frank P. Blair and E. P. Schuler. The officers are: H. B. Schuler, President; Frank P. Blair, Vice-President, and E. P. Schuler, Secretary and Treasurer. This company was incorporated in Illinois in September to build a line around Moline, Ill., Rock Island and Davenport, tapping all the roads running into those cities. (Sept. 23, p. 696.)

Denver & Rio Grande.—Edgar H. Booth has been elected Secretary, succeeding Wm. Wagner, resigned on account of continued ill health. Mr. Booth's headquarters are at 47 William St., New York.

El Paso & Northeastern.—J. L. Campbell, Chief Engineer, has resigned. He is succeeded by H. A. Sumner. (Oct. 28, p. 785.)

Gulf & Chicago.—C. L. Harris, Superintendent, has resigned and the office has been abolished. The General Manager, A. E. Davis, will have charge of the operation and maintenance of property. M. C. Falkner has been appointed Auditor and Treasurer. He will also have charge of the Traffic and Freight Claim departments, with headquarters at Ripley, Miss.

Gulf, Beaumont & Kansas City.—R. Smith has been appointed Roadmaster, with jurisdiction over the Bridge and Building departments. His headquarters are at Beaumont, Tex.

Kansas City, Pittsburgh & Gulf.—W. E. Green, heretofore Superintendent of the Southern Division, with headquarters at Texarkana, Tex., has been appointed Assistant General Superintendent. His headquarters will remain at that point. C. J. Snook, General Freight Agent of the Southern Division (Texarkana & Fort Smith) has resigned. He is succeeded by G. S. Reid. C. A. Peabody, Auditor and Treasurer of the same division, has been succeeded by J. B. Day.

Lake Erie & Western.—Frank S. Hill has been appointed Acting Claim Agent, with headquarters at Indianapolis, Ind.

Louisville & Nashville.—D. N. Goodwin has been appointed Assistant General Freight Agent, with headquarters at Louisville, Ky.

Middletown, Meriden & Waterbury.—The officers of this company, referred to in the News column are: President and Treasurer, A. Heaton Robertson, New Haven, Conn.; Secretary, John B. Robertson, New Haven. The Directors, in addition to A. Heaton

Robertson and John B. Robertson, are Frederick C. Wagner, Henry C. Ely and William Clark, New York; John L. Billard, Chas. L. Rockwell and H. L. B. Pond, Meriden, Conn., and Frederick J. Kingsbury, Waterbury, Conn.

Missouri, Kansas & Texas.—The offices of A. D. Arbegast, General Foreman of the Bridge and Building Department, which were moved to Dallas, Tex., last spring, are removed to Denison.

Mobile & Bay Shore.—At a recent meeting of stockholders of this company, lately incorporated in Alabama to build an extension of the Mobile & Ohio, E. L. Russell, First Vice-President of the M. & O., was elected President; R. V. Taylor, General Auditor of the M. & O., Vice-President, and Henry Tacon, Treasurer and Secretary of the M. & O., Secretary, all of Mobile, Ala.

New York Central & Hudson River.—Henry Vier, who has been in charge of the grade crossing work at Buffalo, has been appointed Chief Engineer of the Map and Survey Department, with headquarters at Syracuse, N. Y. H. C. Merriman takes Mr. Vier's place at Buffalo.

New York, Susquehanna & Western (Erie).—Judge W. J. Lewis, General Manager, has resigned. The duties of the office will be assumed by Captain W. A. May, Superintendent of the Hillside Coal & Iron Co., a mining company operated under the Erie's management.

Oconee & Western.—At the annual meeting of the stockholders, held at Empire, Ga., Nov. 7, A. F. Daley, General Attorney for the Wrightsville & Tennille, was elected President and General Manager. He succeeds H. A. Clare as President, and Robert H. England as General Manager. The road will henceforth be operated in connection with the Wrightsville & Tennille. The headquarters are at Tennille, Ga.

Oregon Short Line.—J. B. Berry has been appointed Consulting Engineer, with headquarters at Salt Lake City.

Pittsburgh & Lake Erie.—Carl Zinck, Assistant Supervisor, has been appointed Assistant Engineer of Construction and Maintenance of Way, with headquarters at McKee's Rocks, Pa. Edwin F. Wendt has been appointed Assistant Engineer in charge of Maintenance of Way and Construction Work on the main line, with headquarters at Pittsburgh, Pa.

Pittsburgh, Bessemer & Lake Erie.—H. T. Porter has been appointed Chief Engineer, with headquarters at Pittsburgh, Pa. The office of Engineer Maintenance of Way, lately held by Mr. Porter, has been abolished.

Prescott & Northwestern.—The following are the officers of this road, recently chosen: J. H. Bemis, Vice-President; J. W. Bemis, Secretary and Treasurer; H. E. Bemis, Auditor; C. M. Bemis, Purchasing Agent; O. H. Helbig, General Passenger Agent, all having headquarters at Texarkana, Tex. S. P. MacConnell, Vice-President of the Ultima Thule, Arkadelphia & Mississippi River, has been appointed General Freight Agent, with headquarters at St. Louis, Mo.

St. Louis & San Francisco.—H. H. Brown has been appointed Trainmaster of the Kansas and Oklahoma divisions. He was heretofore Chief Train Dispatcher at Monett, Mo. He is succeeded by B. F. Hunter.

Southern.—Wm. Maxwell has been appointed Trainmaster, with headquarters at Columbia, S. C.

Southern California (Southern).—At the annual meeting, held in Los Angeles, Cal., Nov. 3, Paul Morton, Chicago, was elected Second Vice-President and E. D. Kenna First Vice-President.

Southern Pacific.—The position of Fuel Expert, held by J. C. Martin, was discontinued Oct. 6. Mr. Martin has since been appointed Road Foreman of Engines, succeeding W. H. Russell, assigned to other duties.

F. R. Bright, Trainmaster, Colton, Cal., has resigned. He is succeeded by D. A. Bruce.

Union Pacific, Denver & Gulf.—B. L. Winchell, heretofore General Passenger and Ticket Agent of the St. Louis & San Francisco, has been appointed Assistant to the President of this reorganized line. His headquarters are at Denver, Col.

Washburn, Bayfield & Iron River.—Martin Brown has been appointed Master Mechanic, with headquarters at Washburn, Wis.

Washington County.—Chas. H. Priest, heretofore Train Dispatcher of the Maine Central at Bangor, Me., has been appointed Chief Train Dispatcher, with headquarters at Calais, Me.

Wisconsin Central.—C. C. Hill has been appointed District Passenger Agent for Illinois and Indiana, succeeding C. A. Myers, resigned, with headquarters at 230 Clark street, Chicago. Mr. Myers held the title of Traveling Passenger Agent at Chicago.

RAILROAD CONSTRUCTION,
New Incorporations, Surveys, Etc.

ARKANSAS & CHOCTAW.—Grading is reported completed for 12 miles into Indian Territory, from the Arkansas line, on this road, from Ashdown, Ark. It is stated that, if the company makes arrangements to connect with the Texas Midland, the road will turn off at Doakville to Paris, Tex. W. H. Carson, Texarkana, Ark., is Superintendent. (Oct. 14, p. 750.)

ASHLAND & WOOSTER.—Track laying is begun, according to report, at Jeromeville, on this line from Jewett, O., through Stark Co., 52 miles to Ashland. H. B. Camp, of Akron, O., is President and General Manager. (July 8, p. 502.)

ATLANTIC COAST LINE.—Abercomble & Williams of Montgomery, Ala., have the contract for building the extension from Denmark, S. C., northwest 34.7 miles to Robbins. (Nov. 11, p. 820.) The work is not difficult. The maximum grade will be 32 ft. per mile, and the maximum curvature 3°. It will require no bridges, and but few trestles. (Official.)

BALTIMORE & OHIO SOUTHWESTERN.—It is reported that the laying of 5,000 tons of 80-lb. rail has been begun between Chillicothe, O., and Parkersburg, W. Va.

BANGOR & AROOSTOOK.—During the quarter ending Sept. 30, $26,642 was spent in repairs to roadway and $8,890 in renewing rails and ties. (Official.)

CANADIAN PACIFIC.—Our Canadian correspondent, after a trip to the Pacific coast, reports with reference to the Columbia & Western line now building from Robson, B. C., west 105 miles to Midway, that Contractor Cusson has established his camp two miles below Grand Forks, and will begin grading up to the city limits immediately. He aims to have his contract completed before snow flies, so that the heavy rock work above Grand Forks can be prosecuted during the cold weather. Of the estimated 14,000,000 ft. of timber to be used in the bridges, over 750,000 ft. will be needed for the bridge over Moberly Creek at Shield's Landing. This bridge is to be 800 ft. from grade to grade, the big span being 150 ft. long, and 195 ft. high. There is about 500,000 ft. of timber ready, and the putting in of the falsework is under way. J. C. McLean & Co., contractors, have 250 men at work on their contract, divided into 10 camps, and are pushing their work with great rapidity. Contractor O'Leary has 250 men at work on the 700 ft. tunnel. (Nov. 11, p. 820.)

The C. P. R. is reported to have under consideration a proposition for completing the Napierreville Junction Ry. This company was incorporated in 1878, with power to build a line from St. Remi, Que., to Napierreville, with the privilege of extending to St. Johns. Between seven and eight miles is built. A bonus of $2,500 has been voted by the municipality of St. Edward, $10,000 by the municipality of Napierreville, a subsidy of $3,200 per mile has been granted by the Dominion Government, and as much more by the Provincial Government.

CANADIAN ROADS.—Application has been made to the Canadian Parliament for an act to incorporate a company to build a railroad from Dawson City, N. W. T., thence along the Klondike River to the confluence of Hunter Creek, Dominion Creek, Indian River, to its junction with the Yukon, thence along the Yukon back to Dawson, with power to build a branch up Eldorado Creek to Dominion Creek.

Application will be made at the next session of the Canadian Parliament for an act to incorporate a company to build and operate a line from a point on or near the Stikeen River, to Teslin Lake, thence to Dawson City in the Yukon district; also from a point on or near Stikeen River, thence south to a point in British Columbia capable of being made an ocean port; also from a point on or near the waters of Lynn Canal, thence by way of Ft. Selkirk to Dawson City; also branch lines along or near any creeks or water courses in the Yukon district; also for telegraph and telephone lines.

CEDAR RAPIDS, GARNER & NORTHWESTERN.—Grading is completed for 13 miles, from Hayfield, Ia., to Brugham, on this line from Hayfield northwest 20 miles via Westerly, Crystal Lake and Brugham into Cossuth County. E. P. Fox of Garner, Ia., has the contract. A. C. Ripley is President and E. P. Boyanton Chief Engineer, both of Garner, Ia. (Nov. 11, p. 820.)

CHESAPEAKE & OHIO.—An ordinance permitting this road to build a spur track from Sixth St. to Byrd St., in Richmond, Va., has been adopted by the City Council.

CHICAGO & NORTHWESTERN.—Double tracks have been laid between Madison and Chicago. The train service from Baraboo, Wis., to Chicago, 175.5 miles, now extends over double track. It is expected that by August, 1899, the 37 miles of double track from Baraboo to Elroy will be completed. (Sept. 9, p. 656.)

Grading is reported in progress for the extension from Denison, Ia., northeast about 80 miles to Algona. (Oct. 14, p. 750.)

CHICAGO, PEORIA & ST. LOUIS.—Ballasting the line between Springfield, Ill., and Jerseyville, Ind., a distance of 64.8 miles, has been completed. A large force of men is ballasting between Jerseyville and Lock Haven. It is expected that the whole line north from Jerseyville will be ballasted next year. (Aug. 6, p. 618.)

CHOCTAW, OKLAHOMA & GULF.—J. H. McCarthy of Little Rock, Ark., and Johnson Bros., St. Elmo, Ill., have been awarded the contract for building the Choctaw & Memphis extension from Wistar Junction, Ind. Ter., east 164 miles to Little Rock, Ark. (Oct. 14, p. 750.)

CINCINNATI, HAMILTON & DAYTON.—General Manager Waldo is reported to have said that the new freight terminals at Indianapolis will probably be commenced about Jan. 1 next.

CLEARFIELD SOUTHERN.—Grading is completed from Porter's Station, Pa., on the Beech Creek line, to Driftwood Island, eight miles. The road is to be extended through to Belsena Mills, on the Pennsylvania, 15 miles. There are 200 men and eight teams at work on the iron bridge at Porter's. D. McGaughey & Co. have the first eight miles of contract. (Oct. 7, p. 732.) A. W. Lee of Clearfield, Pa., is President. (Official.)

COAST RAILWAY OF NOVA SCOTIA.—L. H. Wheaton, Yarmouth, N. S., Chief Engineer, states that there is no foundation for the report (Nov. 4, p. 804) that the Yarmouth Steamship Co. and an English syndicate are considering the question of buying that road and continuing it to Halifax. He states that the company is putting forth every effort to push the road along and hopes to have it open to Barrington early next season. Surveys are completed for the entire line to Halifax.

DALLASTOWN.—S. M. Manifold is reported to have a contract for building this line from a point near Red Lion, Pa., southwest about 1¾ miles to Dallastown, and work is to begin immediately. (Nov. 11, p. 820.)

DETROIT & MACKINAC.—President Hawks writes that the company is making an extension of four miles from Onaway, Mich., to the Black River. (Sept. 21, p. 768.)

According to press reports, the company has just completed an extension of eight miles on the Stiles Lake branch of its Prescott Division. This extension runs into a trace of pine and hardwood timber owned by C. H. Prescott & Son, Cleveland, O.

EVERETT & MONTE CRISTO.—The track between Robe and Tunnel No. 1, five miles, has been taken up.

FOURTH POOL CONNECTING.—This company was incorporated in Pennsylvania, with a capital stock of $150,000, to build a line nine miles long from Lock No. 4, on the Monongahela River, to connect with a projected line in Fayette County. The Directors are: Samuel A. Roelofs (President), H. C. Richardson, Elwood City, Pa.; Albert McNames, McKee's Rocks; John H. Bragdon, Nevilton; Joseph F. Ryan, Chas. F. Patterson and F. L. Roberts, Pittsburgh.

GALVESTON, BRAZOS & SOUTHWESTERN.—Negotiations are reported about closed for extending this line through to San Antonio, Tex. It is stated that the grade has been finished from Fairwood, near Hitchcock, out almost to Angreton. The line, as projected, is to run from Galveston, Tex., west about 150 miles to Victoria. L. E. Beadle, of Galveston, is Chief Engineer. (July 8, p. 503.)

GULF, BEAUMONT & GREAT NORTHERN.—Preliminary surveys are reported completed for the extension north 60 miles to Jefferson, Tex. W. H. Hanson has the contract for the first 10 miles from Kirbyville north. The plans call for an extension to Paris, in all about 350 miles. (Sept. 30, p. 714.) John H. Kirby, of Houston, Tex., is President.

ILLINOIS CENTRAL.—Active preparations are in progress for building the new terminal at New Orleans, La. Surveys are being made and grading is in progress for the tracks. It is reported that about 50 miles of track will be laid at the terminal. The new yards are in the Parish of Jefferson, a suburb of New Orleans.

INTEROCEANIC OF MEXICO.—The last annual report, under date of Nov. 4, gives facts with reference to the building of the new road by that line as follows:

The Board had, a short time before the debenture holders' meeting, decided upon the construction of a line of 39¼ miles in length to connect the Morelos and Matamoras branches, reports received from the management in Mexico having satisfied them that this connection would prove most beneficial to the company. This new line should do much to stimulate the development of the district it will serve, which is reported to be very fertile, there being already considerable produce and several important sugar factories; there are also minerals and large timber forests which have never been worked.

Government and State subventions, contributions of land and cash from land owners, and materials which will be available by taking up the last 10 miles of track on both the Morelos and Matamoros lines, will, it is estimated, reduce the cost to the company of this new line to £30,000.

It has been decided to take up the rails for the 10 miles beyond Zacatepec, as competition would prevent the profitable working of this piece of road; the 10 miles at the end of the Matamoros line will also be taken up, the cost of its maintenance being very heavy, owing to the nature of the soil, while the traffic of the district now served by this portion of the line will still be carried by the company.

From Zacatepec the distance to Vera Cruz will be 87½ miles shorter over the new line than via Mexico, and 12 miles shorter than by the broad gage route. The company will, therefore, be placed in an advantageous position to obtain traffic from the Zacatepec district destined for Vera Cruz or Puebla, the distance to the latter being—via Oceanic new line, 143 miles; via Mexico and the broad gage lines, 217 miles. The work of construction will not be commenced until all the formalities connected with the subventions and contributions have been completed.

INVERNESS & RICHMOND.—Peter Ryan, of Toronto, Ont., who is interested in this road, writes that it is now under construction with a small force, but that the opening of next year will be accompanied by a full field force, and they have every assurance that the line will be completed for 100 miles during the years 1899 and 1900. (Nov. 4, p. 804.)

JAMESTOWN TERMINAL.—This company was incorporated in New York, Nov. 9, with a capital stock of $50,000, to build a steam road one mile long in Jamestown, Chautauqua County. John W. Doubleday of Jamestown is among the directors.

MISSISSIPPI RIVER, HAMBURG & WESTERN.—Work is reported progressing rapidly on the eastern end, and the General Manager hopes to have the line finished to the Mississippi River before the end of the year. It is to run from Hamburg, Ark., east 46 miles to Cone City, on the Mississippi. James M. Parker of Hamburg, Ark., is General Manager. (Sept. 30, p. 715.)

MUSCATINE, NORTH & SOUTH.—Trains are running as far as Wapello, Ia., on this line from Elrick, north 30 miles, to Muscatine. W. R. Stewart, Jr., 58 Board of Trade Building, Chicago, is President. (Nov. 4, p. 804.)

NEW ORLEANS & NORTHWESTERN.—It is expected that the entire line will be ballasted between Meridian, Miss., and New Orleans, in March, 1899. The replacing of the 60-lb. English steel rail, laid in 1882, with 75-lb. rail, which began in August, 1897, and is in progress, will be completed to Enterprise, Miss., 18 miles, by December prox. (Oct. 28, p. 787.) It is expected that about 25 miles will be laid each year until all is replaced. No new securities are being issued to cover the cost of improvements. (Official.)

NEW ROADS.—E. H. Saltiel, President of the Wyoming Land, Iron & Coal Co., of Rawlins, Wyo., writes that his company has offered 500 tons of coal, iron and lime traffic, at the start, to the first railroad that builds to the company's mines, and 1,000 tons daily within six months after.

Messrs. Dunn & Lallande, of Birmingham, Ala., are reported to have begun grading on the 4½ miles of road for the Pioneer Mining & Manufacturing Co. of Birmingham, from Thomas to their newly acquired coal lands. (Nov. 11, p. 820.)

P. McGovern, a contractor of Du Bois, Pa., is reported to have begun building a road for N. L. Hoover & Co., from a point near Glen Campbell, six miles west of a lumber tract. He employs about 100 men, and expects to have the road completed within 60 days.

Powers & Simpson are reported to have opened an office at Hibbing, Minn., to build a logging road from that place west 33 miles.

The Michigan Coal & Mining Co., of which J. A. Etzold of Bay City, Mich., is President, proposes to build a road 1½ miles long from its coal mines to the Midland Branch of the Michigan Central in Monitor township. Bids have been received.

NORTHERN MICHIGAN.—A. C. Wright, of Houghton, Mich., is reported to have gone to Chicago

to engage surveyors to run lines for this proposed road from Calumet, Mich., southwest about 90 miles to Watersmeet, on the Chicago & Northwestern. William A. Paine, of Boston, Mass., is said to be among those interested.

NORTHERN PACIFIC.—The report that grading is begun on the extension of 100 miles of the Sykeston branch, from Sykeston west to the Missouri River (Sept. 28, p. 786), is declared by an official to be entirely baseless.

OREGON SHORT LINE.—This company has awarded a contract of supplying $160,000 worth of ties during the coming season to the Rock Springs Lumber Co., Rock Springs, Wyo.

PENNSYLVANIA.—The grading on the third track from Altoona, Pa., to Gallitzin, was completed on Nov. 10, and the entire new track was opened for service. Chief Engineer Brown has awarded the contract of changing the line east of Kinzer's, Pa., to Drake & Stratton; for a second additional track east to Elizabethtown, Pa., to John Keller; for laying No. 1 track from Johnstown bridge to Sheridan, to H. S. Kerbaugh, and the building of another track from Lang Hollow to Conemaugh furnace, to P. McManus.

Newspaper reports state that the Scalp Level line is to be extended several miles to a tract owned by James Curry & Son, but an official of the company writes that this branch has not yet been authorized.

PHILADELPHIA & READING.—The new double track between Tamaque and East Mahoney Junction was completed and ready for traffic Nov. 7. (July 8, p. 503.)

PITTSBURG & WESTERN.—Work on the Eidenau cut-off between Harmony and Butler, Pa., will be begun shortly. It will be about nine miles in length. A contract for the first four miles has been let to Mr. Broadhead of Youngstown, and the remaining five miles is in the hands of W. W. Hegeman & Co., of New York, and Nicholas Masselli of Butler.

QUEEN ANNE'S.—General Manager I. W. Troxel, of Queenstown, Md., is reported to have made a visit recently to Centreville in response to a petition by the citizens of that town requesting that his road be extended from Queenstown north to Centreville. Should this extension be made, it will form a part of the proposed line from Queenstown north via Centreville, Church Hill and Crumpton to Elkton, about 54 miles. Mr. Troxel wrote in July that this extension, at that time, had not been definitely decided upon. (May 7, 1897, p. 331.)

RUTLAND.—Surveys are reported in progress for the proposed Rutland & Canadian extension from Burlington, Vt., north about 60 miles through the chain of islands in the northern part of Lake Champlain to Alburgh. (Nov. 11, p. 820.)

SABINE PASS & NORTHWESTERN.—The route of this line, recently chartered in Texas, is from Sabine Pass, northwest 300 miles over the Divide between the Trinity and Naches rivers, through Jefferson, Hardin, Polk, Trinity, Hamilton, Anderson, Henderson, VanZandt, Hunt and Fannin counties, to Bonham; through the towns of Livingston, Palestine, Groveton, Athens, Canton and Greenville. The land is open 75 miles above Sabine Pass and no hills. There will be but three small trestle bridges, and but little other trestling. The maximum grade will be not over 1 per cent., and the maximum curvature 10°. Preliminaries are under way for early building, and contracts will be let Jan. 1. The general office, for the present, is at Greenville, Hunt County. (Nov. 4, p. 804.) W. H. Brooker of Greenville, Tex., is among those interested. (Official.)

SACRAMENTO VALLEY.—C. E. Loss & Co., 621 Pullman Bldg., Chicago, have the contract for building this line from McConnico Junction, a point near Kingman, Ariz., northwest 53 miles, via Chloride, to White Hills. Surveys are completed as far as Chloride, 22 miles. S. B. McConnico of Kingman is President. (Oct. 28, p. 786.)

ST. LOUIS & OKLAHOMA CITY.—Trains began running Nov. 14 on the extension of the St. Louis & San Francisco from Sapulpa, Ind. Ter., 103.32 miles to Oklahoma City. (Nov. 4, p. 804.)

SANDYVILLE & WAYNESBURG.—This company has been incorporated in Ohio, with a capital stock of $50,000, to build a railroad from Sandyville, on the Cleveland Valley & Terminal Line of the B. & O., to run northeast to Waynesburg in Stark County. The Directors are: F. H. Goff, C. H. Gale, F. H. Bushnell, John H. Smart and John E. Morley. The principal office is Cleveland.

SAN FRANCISCO & SAN JOAQUIN VALLEY.—The Atchison, Topeka & Santa Fe has bought a block of land in San Francisco, bounded by Spear, Maine, Harrison and Bryant streets, and including 24 lots and six water lots, for the proposed terminals of the Valley road in that city. The plan is to carry freight in cars across the bay from Point Richmond. (Nov. 11, p. 821.)

TALLAHASSEE SOUTHEASTERN.—The first section of 20 miles is reported completed to Wacissa River and trains are running. The road, as projected, is to run from Tallahassee, Fla., south 100 miles to the Suwanee River. James M. Mayo, of Ocala, Fla., is Vice President. (Oct. 14, p. 750.)

UNION PACIFIC.—Two tracks are being built at Council Bluffs to a grain elevator. The tracks, together with the switches, will be about three miles in length.

WATERVILLE & WISCASSET.—The stockholders are reported to have instructed the President to sign a contract with the Kennebec Construction Co., to build this line from Weeks Mills, Me., north 13.3 miles, via China, East and North Vassalboro and Winslow to Waterville. John H. Burleigh, of Waterville, is Chief Engineer. (Sept. 23, p. 697.)

WHEELING & LAKE ERIE.—By direction of the Secretary of War, a public hearing is to be held at Martins Ferry, O., Nov. 21, upon an application of the company to extend its railroad outside the harbor line of the Ohio River in that city.

WINNIPEG & SOUTHEASTERN.—Mr. Bruce, locating engineer, says that the exploring party, after penetrating to Rainy River and returning to Rat Portage, reports a good country, which can be easily graded, but which is full of swamps and will require much filling. At present 95 miles of the road is finally located, 50 miles of which, extending from St. Boniface, is graded, and 30 miles of track laid. Track laying is much impeded by bad weather, but Mr. Bruce hopes that the Cypress Hills will be reached before the next season closes, in order that cord wood and timber may be got out this winter. The Cypress Hills are 80 ft. above the surrounding country, and the railroad runs over them in a straight line for 22 miles until it strikes the Roseau River. (Oct. 28, p. 787.)

Electric Railroad Construction.

BANGOR, ME.—The Penobscot Central RR. has begun operations. The road extends from Bangor to East Corinth, 20 miles. In a few weeks an extension of 6 miles will be completed to Charleston. Patton motor cars are used. (May 6, p. 333.)

BLUE RIDGE SUMMIT, PA.—Plans for building the electric railroad over the Blue Ridge Mountains are being perfected. The Blue Ridge Electric Ry. Co. has selected Major Norwood, of Blue Ridge Summit, Pa.; Peter Rouzer, of Rouzerville, and Dr. Amberson, of Waynesboro, Pa., a committee to decide upon the route. (Jan. 14, p. 34.)

CHICAGO, ILL.—The United Traction Co. is reported incorporated with a capital stock of $500,000. The incorporators are Albert E. Wilson, Anson E. Meanor and Louis J. Behan.

EASTON, PA.—The Easton, Palmer & Bethlehem Electric Ry. was formally opened Nov. 10. The road is 12 miles long and cost $200,000. (Aug. 19, 604.)

EXETER, N. H.—The Hampton & Amesbury St. Ry. Co. is building to Newburyport, and expects to have cars running by Dec. 10; Soul, Dillingham & Co., contractors, Boston, are doing the work. In the spring an extension will be built from the state line to Amesbury, four miles. The Hampton & Amesbury will be leased and operated by the Exeter St. Ry. Co. In the spring the Exeter Co. will build an extension from Exeter to Epping, N. H., seven miles, and one from Hampton Beach to Rye, to connect with the Portsmouth electric railroad; 60-lb. rails will be used, and 10 cars added. The officers of the Exeter St. Ry. Co. are: Wm. Lee, President; C. E. Hollander, Treasurer, Boston; A. E. McReel, Superintendent, Exeter.

HATBORO, PA.—The Hatboro Ry. Co. is reported incorporated with a capital stock of $30,000, to build an electric railroad from Hatboro to Willow Grove, The incorporators are James McGregg, Samuel J. Garner, James Van Horn, James W. Rusling and R. Ashurst, Philadelphia, Pa.

INDEPENDENCE, MO.—The Jackson County Electric Ry. Co. is incorporated with a capital stock of $70,000. Among the incorporators are F. W. Sears and J. J. Hoover, both of Kansas City. (Sept. 23, p. 697.)

INDEX, WASH.—Press reports state that the Sunset Falls Power Co. contemplates building an electric railroad from Index to Galena.

JACKSON, MISS.—The Jackson, Clark Lake & Brooklyn Company has been organized to build an electric railroad about 15 miles long in Jackson County. The officers are Clark Cornwell, President, Jackson; Frank Joslyn, Secretary and Treasurer; W. B. Joslyn, Superintendent, 223 River St., Ypsilanti; A. S. Woodard, Assistant Superintendent and Electrician. Surveys are completed to Vandercooke Lake and contracts let for grading; other contracts will be let in the spring. About 20 cars will be bought.

LYNCHBURG, VA.—The Lynchburg & Rivermont St. Ry Co. has asked the City Council for a franchise to make a number of extensions.

MARYSVILLE, O.—An electric railroad is projected between Marysville, Magnetic Springs, Pharisburg and Richwood. M. A. Wright is mentioned as interested in the matter.

MIDDLEBORO, MASS.—The Taunton & Middleboro St. Ry. Co. is organized, with a capital stock of $50,000, to build an electric railroad from Middleboro to East Taunton. The road will connect at Middleboro with the New Bedford, Middleboro & Brockton, and at East Taunton with the Taunton & East Taunton.

PITTSTON, PA.—Pittston & Scranton St. Ry. Co. is incorporated to build a line three miles long in Lackawanna and Luzerne counties; capital stock, $75,000. The incorporators are: James A. Steese, President; Charles H. Mullen, D. A. Dunlevy, Mount Holly Springs; Lane S. Hart and W. H. Metzger, Harrisburg.

PORT CHESTER, N. Y.—The Port Chester St. Ry. Co. has made application for the extension of its road from the present terminus, in Rye Village, to Mamaroneck, to connect with the Mamaroneck, White Plains & Tarrytown Ry.

SCHUYLERVILLE, N. Y.—Press reports state that J. D. Powers, of Sandy Hill, is interested in a project to build an electric railroad between Schuylerville and Greenwich.

VICKSBURG, MISS.—It is stated that the Vicksburg Electric St. Ry. has let a contract for building four miles of road to the North American Construction Co., of Chicago. Rails and other material are on the ground. (June 24, p. 467.)

GENERAL RAIL ROAD NEWS.

Railroad Earnings.

Showing the gross and net receipts for the periods ending at the dates named:

Sept. 30.		1898.	1897.	Inc. or Dec.
Boston & Maine.				
3 months	Gross	$5,426,971	$5,665,896	D. $238,924
3 "	Net	1,850,996	1,917,950	D. 66,953
Chicago, Indianapolis & Louisville.				
1 month	Gross	$323,624	$311,678	I. $11,946
1 "	Net	121,057	106,563	I. 14,494
3 months	Gross	927,500	921,942	I. 5,558
3 "	Net	329,772	296,667	I. 33,105
Flint & Pere Marquette.				
1 month	Gross	$293,210	$251,850	I. $41,361
1 "	Net	91,923	79,411	I. 12,512
9 months	Gross	2,216,586	2,020,948	I. 195,639
9 "	Net	557,006	514,532	I. 42,474
Illinois Central.				
1 month	Gross	$2,384,614	$2,346,202	I. $38,412
1 "	Net	710,603	680,129	I. 30,474
3 months	Gross	6,808,684	6,505,958	I. 302,726
3 "	Net	1,867,379	1,726,219	I. 141,160
Manhattan Elevated.				
3 months	Gross	$1,788,613	$1,970,238	D. $181,625
3 "	Net	539,610	705,532	D. 165,922
12 months	Gross	9,204,466	9,359,732	D. 155,266
12 "	Net	3,137,784	3,231,700	D. 93,916
New York, Chicago & St. Louis.				
3 months	Gross	$1,581,741	$1,547,529	I. $34,172
3 "	Net	321,308	367,579	D. 46,270
Pacific Coast Co.				
1 month	Gross	$406,420	$422,436	D. $16,016
1 "	Net	99,439	117,858	D. 18,419
9 months	Gross	4,362,106	3,159,542	I. 1,202,564
9 "	Net	1,018,775	982,334	I. 36,441
Philadelphia & Erie.				
1 month	Gross	$484,248	$515,155	D. $30,907
1 "	Net	186,634	192,752	D. 6,118
9 months	Gross	3,198,471	3,220,830	D. 22,359
9 "	Net	944,195	925,363	I. 18,832
New York, New Haven & Hartford.				
3 months	Gross	$10,798,978	$8,345,149	I. $2,453,829
3 "	Net	4,193,248	3,398,925	I. 794,323

Oct. 31.		1898.	1897.	Inc. or Dec.
Illinois Central (Estimated).				
1 month	Gross	$2,378,150	$2,439,390	D. $61,240
Nashville, Chattanooga & St. Louis.				
1 month	Gross	$540,762	$526,352	I. $14,410
1 "	Net	223,423	212,480	I. 10,943
4 months	Gross	2,144,404	1,983,999	I. 160,405
4 "	Net	856,924	754,098	I. 102,826
New York Central & Hudson River.				
1 month	Gross	$4,252,099	$4,208,248	I. $43,850
10 months	Gross	37,418,909	37,828,872	D. 409,963
Western New York & Pennsylvania.				
1 month	Gross	$291,400	$341,700	D. $50,300
4 months	Gross	1,118,200	1,260,100	D. 141,900

BALTIMORE & OHIO.—A demurrer to the amended and supplemental petition of holders of first preferred stock, was filed in the United States Circuit Court at Baltimore, Nov. 11, by the Mercantile Trust Deposit Co. of Baltimore. As to the allegation that the reorganization plan is "not only constructively, but actually fraudulent," and to other points of the petition, the company makes reply:

The only material issue raised, or that can be raised by any of the petitions, is whether or not the receivers properly made default in the payment of interest upon the main line mortgages. If such defaults were proper and necessary, owing to the financial condition of the railroad company, it is entirely immaterial that the Directors of the company or the Reorganization Committee or Managers have made or are intending to make or carry out any plan for the disposal of the property and assets of the Baltimore & Ohio Railroad Company after the same shall have been lawfully sold, under the decree of this court, or that they expect thereafter to have any interest therein.

The underwriting syndicate is reported to have sold the remaining $8,000,000 of the new first mortgage 50-year gold bonds.

BROOKLYN ELEVATED.—The B. E., including the Union Elevated, absorbed, and the Seaside & Brooklyn Elevated, a leased line, were sold under foreclosure at Brooklyn, N. Y., Nov. 10, to Adrian H. Joline, representing the reorganization committee, at the following prices: B. E., $1,750,000; U. E., $3,075,000; S. & B. E., $682,500. (Nov. 11, p. 821.)

CAPE FEAR & YADKIN VALLEY.—Several months ago the United States Circuit Court of North Carolina decided that this proprety must be sold as a whole, and that the proceeds be divided as follows: To the A division bondholders ($1,500,000 outstanding), 55 per cent.; to B bondholders ($754,000 outstanding), 19 per cent.; to C bondholders ($820,000 outstanding), 19.6 per cent., and to branch lines, 6.4 per cent. If the road were sold for $2,000,000, the upset price, not much would be left, on this basis, for the B and C bondholders, so the Baltimore Committee has made arrangements to pay a price for the road commensurate with the value of the B and C bonds, under its plan of reorganization, or else to compel other buyers to pay a price which would yield satisfactory results to these bondholders. The New York Committee, which has attempted to force a sale of the road by divisions, has appealed the case to the Supreme Court, but is reported to be willing to withdraw the suit and let the property come to a sale. The plan of reorganization of the Baltimore Committee is to issue $3,400,000 first mortgage 4 per cent. bonds, $1,700,000 first preferred, $600,000 second preferred and $900,000 common stock. The A division bondholders would receive 100 per cent. in new 4 per cent. bonds, and $400 preferred stock for each $1,000 bond. The B and C bondholders would receive 75 per cent. in the new 4s and $600 in preferred stock for each $1,000 bond. It was proposed to issue $400,000 of prior lien bonds to pay off claims prior to the mortgage, but under the receivership funds have been accumulated sufficient to pay these claims. The Baltimore Committee some time ago made arrangements with the Seaboard Air Line to lease the property, guaranteeing interest on bonds, etc. It is stated that the New York Committee has made an agreement with the Southern to buy the property, and a contest has been on between the two systems to obtain its possession. The road went into the hands of receivers March 31, 1894. It extends from Wilmington, N. C., to Mt. Airy, 248 miles, with several branches. (May 13, p. 349.)

CHICAGO & SOUTHEASTERN.—Suit was brought Nov. 7 by the people of Madison County, Ind., to annul the franchise of this road and to appoint a receiver. The action is brought under an old judgment, and is one of several similar actions which have, for the past few years, been filed against this road. (June 17, p. 446.)

CHICAGO, BURLINGTON & NORTHERN.—In conformity to the terms of the company's second mortgage 6 per cent. bonds, due June 1, 1918, notice is given that on June 1, 1899, the company will redeem its entire issue of these bonds ($3,450,000 outstanding) at par and accrued interest to that date, after which time interest will cease. Until further notice, holders of these bonds may remove the coupons due Dec. 1, and present the bonds with the coupons due June 1, 1899, attached, and they will be paid $1,030 per bond, less interest, at the rate of 3 per cent. on the same, from the date of such presentation to June 1.

CHICAGO, MILWAUKEE & ST. PAUL.—With reference to the report that this company is to buy the Mason City & Fort Dodge, as widely reported in the press, the President of the C., M. & S. P. writes that the company is not proposing to make such purchase.

DELAWARE & HUDSON CANAL.—The Adirondack Railway Co. has appealed from the decision of Justice Chester, in the New York Supreme Court, to the Appelate Division, in the appeal recently decided in favor of the state against the proposed extension of the company's lines across state lands from North Creek, northwest about 50 miles to Tupper Lake. The company takes exception to the decision that the people of the state have become owners in fee of the right of way in question, and that the railroad company has acquired no rights which it can assert against the state. (Nov. 11, p. 820.)

DENISON & NORTHERN.—The United States Circuit Court for the Southern District of Indian Territory, at Ardmore, has confirmed the apprisal of this road, and entered an order on the docket ordering the court to proceed with the sale after advertising for 20 days. An application was made for appeal from the report of the apprisal commission, which appeal was granted and will be heard at the next sitting of the Court of Appeals, to be held in South McAlester. (Nov. 4, p. 805.)

DETROIT & LIMA NORTHERN.—Judge Ricks, of the United States Court, at Toledo, O., has allowed certain small local claims against this road. Special Master Belford, in the matter of the claim of W. B. Strang, Jr., allows $78,761. The road went into the hands of a receiver Sept. 6. (Nov. 4, p. 805.)

Press reports state that A. E. Stillwell, President of the Kansas City, Pittsburgh & Gulf, will take an active interest in the property, and that the capital back of him will place $2,000,000 of the bonds. C. M. Haskell, already largely interested in the property, will take $500,000 of the bonds. With these resources, it is thought that the reorganization can be effected within three or four months. This reorganization will care for all the claims and provide sufficient funds to complete the entire system between Detroit and Columbus, with a branch to Toledo. Under the arrangement it is stated that Mr. Stillwell is to become President of the D. & L. N., with the privilege of naming five directors, and that Mr. Haskell will become Vice President and name the other five directors. The road, when organized, will probably be named the Central Terminal & Connecting.

GREAT NORTHERN.—In a circular issued by this company, offering to buy the outstanding shares of the St. Paul, Minneapolis & Manitoba at 125, payable in stock at par (Nov. 11, p. 822), it is stated that the proposed acquisition is authorized by law and is approved by the stockholders. Shareholders desiring to sell their stock on the terms stated, are requested to forward a statement to Edward T. Nichols, Secretary, at the general office of the company, 27 Pine street, before Dec. 31, of the number of shares they propose to sell. They must deliver these shares at that office after Jan. 1 and before Jan. 15. Shares of stock in the G. N., issued in payment, will be entitled to participate on an equality with all other outstanding stock of the company, in all dividends declared after Nov. 1. When the exchange has been entirely completed, it will raise the capital stock of the G. N. from $50,000,000 to $75,000,000.

INDIANA & LAKE MICHIGAN.—The sale of this road did not take place at South Bend, Ind., Nov. 10, as advertised. (Nov. 4, p. 806.)

KENTUCKY & INDIANA BRIDGE.—The United States Circuit Court of Appeals at Louisville, Ky., on Nov. 9 decided that the terminal mortgage on this road is superior to the first mortgage on the greater portion of the terminals, and inferior to the first mortgage on another portion. The court directs a sale of the property and requires that the terminals must be first put up for sale, and then the bridge proper, afterward the property is to be sold as a whole, and the interests on each portion settled in proportion to the bids by sections. (Sept. 2, p. 640.)

LITCHFIELD, CARROLLTON & WESTERN.—There were no bidders at the foreclosure sale of this road at Carlinville, Pa., Nov. 12, at the upset price of $140,000, and the sale is postponed until Nov. 26. (Oct. 14, p. 750.)

MICHIGAN AIR LINE (Grand Trunk).—A certificate has been filed with the Michigan Department of State for a decrease of stock from $4,000,000 to $1,000,000.

MIDDLETOWN, MERIDEN & WATERBURY.—This company, which has been recently incorporated in Connecticut as successor to the Middletown, Waterbury & Connecticut River (Nov. 11, p. 822), is to have a capital stock of $100,000, with no outstanding debts of any kind. The road is in fairly good condition. It has been leased for a year to the New York, New Haven & Hartford, with the understanding that at the expiration of that period it shall be turned back to the company in first-class condition as to grading, tracks, bridges, etc., which work will be done by the N. Y., N. H. & H. The rolling stock is to be furnished by the leasing road. There is no engineer appointed, as the engineer of the leasing road will have charge. The officers and directors are given under Elections and Appointments. (Official.)

NASHVILLE, CHATTANOOGA & ST. LOUIS.—The United States Court of Appeals, at Cincinnati, Nov. 9, handed down a decision in favor of the suit of J. H. Rodgers, of New York, a stockholder of the N., C. & St. L., and directed the cancellation of the leases by this company of the Paducah, Tennessee & Alabama (119.2 miles) and the Tennessee Midland (135.6 miles), which have been operated by this company since Jan. 1, 1896, under the name of the Memphis & Paducah Division.

OGDENSBURGH & LAKE CHAMPLAIN.—The Central Trust Co. of New York notifies holders of its certificates of deposit for first consolidated mortgage bonds of the O. & L. C. that, upon presenting the same to be stamped, in accordance with the amended plan of reorganization, they will receive $20 in cash upon each $1,000 certificate of deposit, and $10 in cash upon each $500 certificate, as advance payment of the coupon maturing Jan. 1 on the new bonds. (June 17, p. 446.)

OHIO SOUTHERN.—Judge Ritchie, at Lima, O., Nov. 5, set aside the motion of Calvin Broadhead to declare void the sale of this road made Oct. 15 to the first mortgage bondholders. The court held that the claims made by Mr. Broadhead were determined more than 30 days before the sale. (Sept. 28, p. 788.)

OREGON RAILROAD & NAVIGATION COMPANY.—Messrs. Kuhn, Loeb & Co., New York, announce that the conversion of the 6% first mortgage bonds of the old company into new 4 p. c. consolidated mortgage bonds has reduced the amount of the old bonds outstanding to about $1,000,000. The basis of conversion remains, until further notice, $1,150 in new 4s for $1,000 in old 6s. (Aug. 19, p. 604.)

The Farmers' Loan & Trust Co., trustee, of New York, will receive sealed proposals up to 12 o'clock noon, Dec. 31, for 159 first mortgage bonds of the old company for the sinking fund.

PHILADELPHIA, READING & NEW ENGLAND.—The reorganization committee, which bought the road at the recent foreclosure sale, took possession of the property Nov. 15. It is stated that the new company will be known as the Central New England RR. (Oct. 14, p. 752.)

PITTSBURGH & WESTERN.—The recent purchase of a majority of the second mortgage bonds (Sept. 21, p. 770) of the P. & W., was made by the Lake Erie & Western interests. Subsequently work was stopped on the Cleveland & New Castle line of the L. E. & W., which parallels the P. & W., from Akron, O., east about 85 miles to New Castle, Pa., where connection will be made with the extension now building of the Buffalo, Rochester & Pittsburgh. When Calvin S. Brice, President of the L. E. & W., was asked last week if he was negotiating for the P. & W., he replied: "Yes, a deal is in progress, but not closed. Such things cannot be done in a week, but require time. Although I am not an officer of the Cleveland & New Castle Ry., it is probable that work will be resumed on it soon. Capitalists do not spend a million in an enterprise and then abandon it." Trackage agreements have been made by the P. & W. with the Buffalo, Rochester & Pittsburgh for an entrance into Pittsburgh over that line. (Sept. 7, p. 733.)

RICHMOND, NICHOLASVILLE, IRVINE & BEATTYVILLE.—Following the refusal to confirm the sale of Oct. 6 last, the road has been advertised for resale on Dec. 3. Col. Bennett Young, representing the original purchasers, has taken steps to appeal from the decision of the court refusing the confirmation of sale, and his bonds are fixed at $50,000. This action will suspend the sale until the appeal is settled. (Nov. 4, p. 806.)

SIOUX CITY & NORTHERN.—Judge Shiras of the Federal Court, in the Northern District of Iowa, has ordered the receivers to pay to the Manhattan Trust Co., New York, $59,000, due on interest coupons.

SOUTHERN PACIFIC.—Speyer & Co., of New York, who recently bought $10,000,000 of the S. P. of California consolidated first mortgage 5% gold bonds, due 1937 (Nov 11, p. 882), offer them for sale at 101½ and accrued interest on Nov. 18, between the hours of 10 a. m. and 3 p. m.

UNION DEPOT COMPANY OF SPOKANE FALLS.—At the public sale of this property, Nov. 12, at Spokane Falls, Wash., the receivers of the Union Pacific bid it in at $245,000, the upset price. (Oct. 21, p. 770.)

UNION PACIFIC, DENVER & GULF.—The second and final installment of the $5.00 per share of stock of the purchase price of the new securities offered under the reorganization plan, must be paid on or before Nov. 28, at the office of the depository in New York, or its agency in Boston. Failure to pay this installment when due will forfeit all rights in respect to the new securities, and on account of the payment of the first installment. (Nov. 4, p. 806.) The line upon its reorganization is to be known as the Colorado & Southern Ry.

WHEELING & LAKE ERIE.—The receivers have been authorized to issue $25,000 in receiver's certificates.

WISCONSIN CENTRAL.—The receivers on Nov. 14 made application to Judge Jenkins at Milwaukee, Wis., for permission to issue a second series of receivers' certificates to the amount of $1,000,000 at 6%, payable five years from March 1, 1899. The issues of $2,000,000, which matured Nov. 15, 1896, and were extended to 1897, and again to Nov. 15, 1898, were granted a further extension of two years upon the payment of a bonus of 1%. As originally issued, these bore the rate of 6% interest, but it was reduced to 5% in 1897, and again restored to 6% in the recent extension.

Electric Railroad News.

BROCKTON, MASS.—Press reports state that Messrs. Pepper & Register, of Hingham, have acquired control of the Brockton, Bridgewater & Rockland Street Ry. (See under Hanover.)

CHICAGO, ILL.—It is stated that negotiations are pending for the consolidation of the Calumet Electric St. Ry., the South Chicago City and the Chicago Electric Traction Co.

DALLAS, TEX.—The Dallas Rapid Transit & Terminal Ry. Co. was sold Nov. 1 to the president of the company, W. F. Thayer, of Concord, N. H., for $32,500, the purchaser to assume an indebtedness of about $8,000.

HANOVER, MASS.—It is stated that Messrs. Piper & Register, of Hingham, have secured control of the Hanover St. Ry., and the road will be consolidated with the Higham St. Ry.

PETERSBURG, VA.—Press reports state that the Petersburg Electric Ry. was bought at foreclosure sale by the bondholders for $55,000.

ROCKFORD, ILL.—The Rockford City Ry. Co. and the Rockford Traction Co. have been consolidated into one company, the Rockford Railway, Light & Power Co., and on Nov. 10 began operations under one management.

TRAFFIC.

Traffic Notes.

A considerable scarcity of freight cars is now reported throughout the Central Western states, and in some places the reporters speak of it as a famine.

The Detroit, Grand Haven & Milwaukee has put on a new night passenger train, starting eastward from Grand Haven at 6:30 p. m. Connection is made at Durand with an express train by which passengers are landed in New York in 24 hours 20 minutes from Grand Haven.

During the "peace jubilee' at Philadelphia, Oct. 24-30, the Pennsylvania Railroad carried to that city 872,975 passengers. On Saturday, Nov. 12, the Pennsylvania carried about 10,000 passengers from Jersey City to Princeton, N. J., to see the football game. Eleven special trains were run, each composed of 10 to 12 cars.

The Toronto World states that both the Grand Trunk and the Canadian Pacific are running sleeping cars between that city and Montreal, in which the regular price for all the berths is one dollar each. The Canadian Pacific car appears to be a tourist, but the one run on the Grand Trunk is said to be a "genuine Pullman," meaning, we suppose, a first-class Pullman sleeper.

Following the action of a number of the principal railroads of Texas in securing an injunction against the enforcement of the reduced tariff for cotton recently issued by the State Railroad Commission, the Commissioners have notified all the other railroads that, the tariff thus being of no effect on the roads that joined in the proceedings before the court, it will be suspended on the other roads also.

Tariffs were filed with the Interstate Commerce Commission advancing grain rates from Chicago and the West to the Atlantic Seaboard two cents per 100 lbs. to go into effect Nov. 10, but, so far as can be judged from the information gathered by the reporters on the Chicago exchanges, this official action has had not the slightest effect on the actual prices paid by large shippers for the transportation of their grain.

The movement of grain to Europe continues heavy, and on Saturday last over one million bushels of wheat was sold at New York. The business of the day before was nearly or quite as large. Peter Wright & Sons, shipping agents at New York, have compiled a list showing that between Aug. 1 and Nov. 7 292 vessels were chartered to load full cargoes of grain at North Atlantic ports, New York to Norfolk, inclusive. The total approximate capacity of these vessels was 36,489,600 bushels. Over 20 million bushels of this grain was to be loaded subsequent to Oct. 31.

General Passenger Agents representing Eastern, Western and Canadian lines have been in conference for three days in Buffalo, but they finally adjourned to allow the Grand Trunk and Canadian Pacific roads to get together and settle their local differences.

Chicago Traffic Matters.

Chicago, Nov. 16, 1898.

Rates on provisions from Chicago to the East have now gone to pieces. The tariff from Chicago to New York is 30 cents per 100 lbs., but large quantities are now being contracted for at 15 cents. The reductions are all on "inside deals," and it is said that the Erie and the Pennsylvania will soon show a marked increase in business. Most of the provisions that go East from this city are carried in private cars, for which the owners get 7½ mills a mile. Local freight officers are very nervous over the present condition of things.

The executive officers of the roads members of the Western Trunk Line Committee have decided to continue the committee. Regular meetings and conferences will be held as before the Supreme Court decision, but there will be no attempt to agree on rates, either openly or in any other way. Rates of individual lines will be promulgated by the commissioners for the information of the other roads of the committee. The three commissioners, Parker, Shute and Courtright, will continue in office, as their contracts with the roads of the committee do not expire until Jan. 1 next, and they can demand a 90-day notice, which practically makes the contracts binding until April 1. The office force of the committee will be reduced to the simple requirements of a bureau of information, this reduction being left in the hands of the Commissiners. All of the roads, including the Chicago Great Western, were represented at the meeting at which it was agreed to continue the committee.

At a conference of the general passenger and freight agents of the lines members of the Central Passenger and Central Freight associations in this city, it was agreed to continue the two organizations after the agreements of each had been revised and the clauses relating to the establishment and maintenance of rates eliminated. The action of these two associations is, however, subject to the approval of the executive officers, who are now meeting in Chicago considering the matter.

All applications for reduced rates for conventions and other gatherings which were formerly acted upon by the different associations, are at present being "hung up." Fortunately at this time of the year these applications are few. It has been nearly a month since any of the requests were acted upon and there are now quite a number of them pending. The disposition of these applications for reduced rates will be the first real test of the railroads' obedience to the Supreme Court ruling, and local officers are in a quandary as to just what to do. Some one road, probably, will announce rates for meetings in its district, and the other lines will give notice of the same rates. This information conveyed to the different chairmen, may then be disseminated by the latter without any violation of the law.

The anti-scalping movement goes on with increased vigor. The railroad companies are leaving the entire fight with the commercial bodies, believing this to be the best policy. When the proper time comes the mercantile interests will have an anti-scalping bill introduced in Congress. But this will not be done until everything is ready to make a winning fight.

There has been some talk here as to the legality of the interchangeable mileage ticket under the Supreme Court ruling in the Joint Traffic case. By some it is claimed that the agreement on this ticket is just as much a violation of the decision as any other agreement involving rates. The question is, are these tickets to be considered a violation of the anti-trust law?